NETWORK WORLD
The Newsweekly of User Networking Strategies
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Inside: New Resource Directory Page 50

FCC plan to free AT&T stirs debate

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — The FCC's proposal to reduce regulation of AT&T is so far-reaching that only a few of the 50 parties that filed comments last week voiced unqualified support for the plan.

In March, the Federal Communications Commission opened a proceeding examining whether the long-distance industry is fully competitive and ready for deregulation.

Although many parties agreed that it's time for a change, they were divided over the FCC's proposed rule changes and whether those rule changes would benefit users.

Groups denounce FCC plan to alter bundling rules. Page 53.

The commission had proposed in March to give AT&T more regulatory flexibility in the belief that more freedom would strengthen competition in the high-end business services market, where AT&T has been losing market share.

The FCC proposed reducing the review process for new AT&T business services — except 800 and international service — from 45 days to one day, and allowing

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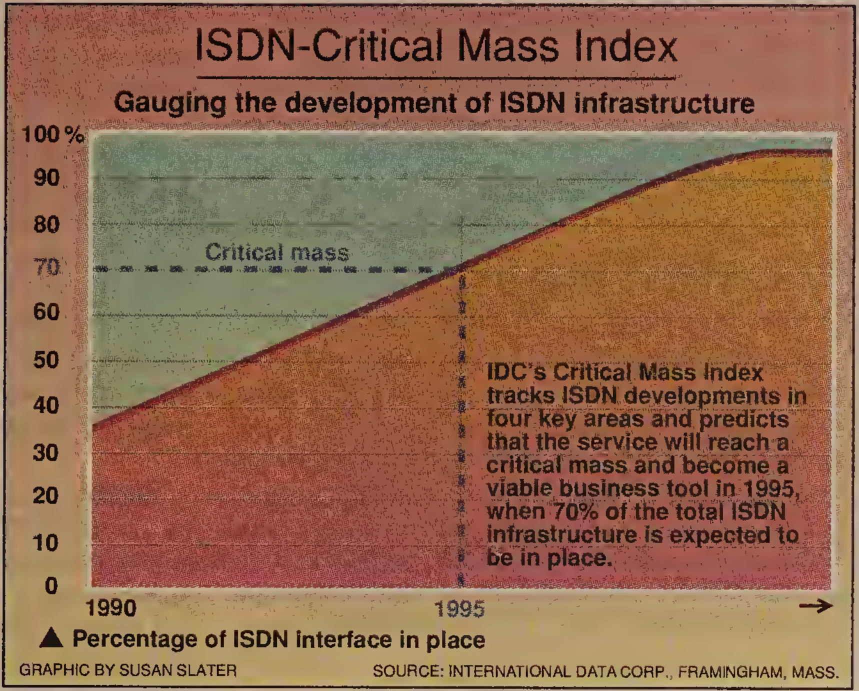

IDC's Critical Mass Index tracks ISDN developments in four key areas and predicts that the service will reach a critical mass and become a viable business tool in 1995, when 70% of the total ISDN infrastructure is expected to be in place.

GRAPHIC BY SUSAN SLATER SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS.

Index gauges deployment of ISDN net infrastructure

Tracks vendors in four major market segments and predicts critical mass will be reached in '95.

By Mary Donovan
Special to Network World

Perceptions of ISDN today are clouded by concerns over ubiquity, a holdover from the predivestiture philosophy that telecommunications services must be universally available to be useful.

But the ultimate value of Integrated Services Digital Networks depends not on ubiquity, but on critical mass — the establishment of sufficient infrastructure to make the service a viable business tool.

International Data Corp. (IDC), a market research firm in Framingham, Mass., has developed the ISDN-Critical Mass Index (CMI) to gauge the evolution of ISDN. The ISDN-CMI, like the Dow Jones industrial average and the Consumer Price Index, is meant to serve as an indicator that can be used to track industry developments and help make investment decisions.

In an exclusive arrangement with *Network World,* IDC will publish updates concerning the ISDN-CMI as market and industry developments warrant.

The ISDN-CMI stands at 36%

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AT&T leapfrogs foes with EasyLink deal

Agrees to buy Western Union's market-leading E-mail service, along with other net operations.

By Bob Brown
Senior Editor

BASKING RIDGE, N.J. — In a move that could catapult it to the top of the electronic messaging market, AT&T last week agreed to pay $180 million to acquire selected assets of Western Union Corp.'s Business Services Group, including its market-leading EasyLink electronic mail service.

Under the agreement, AT&T will purchase EasyLink's customer base, switches and other assets, as well as Western Union's Telex and packet-switching services. Together, those offerings accounted for about $250 million of Western Union's $629 million in revenue for 1989.

Although the revenue generated by the services exceeds the price AT&T plans to pay, analysts said the price is fair considering the value of the assets being acquired. Revenue from Western Union's Telex business has fallen off 25% a year for the past two years.

The agreement calls for Western Union to transfer to AT&T 1,160 of the Business Services Group's employees, which is about a third of all Western Union employees. Western Union and AT&T say they expect to complete the sale by September.

The deal is subject to regulatory approvals and the completion of Western Union's debt restructuring.

The sale of the Business Services Group would mark Upper Saddle River, N.J.-based Western Union's exit from the telecommunications business. Two weeks ago, Western Union announced

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OUTSOURCING
Second in a series

Outsourcing: a tough call for net execs

By Wayne Eckerson
Senior Writer

While outsourcing promises a variety of benefits, determining whether it makes sense for your company is a difficult process that requires exhaustive analysis of a range of factors.

"Costs are only one part of the equation," said Chris Disher, outsourcing practice director at Nolan, Nortan & Co., a consulting firm in Chicago. "You have to consider whether your firm's business objectives, technological requirements, strengths and weaknesses are suitable to outsourcing."

At the heart of the outsourcing decision is the question of whether a user believes an outsource vendor can provide reliable service and performance. Managers interviewed by *Network World* disagreed on whether vendors can provide the same quality service as in-house staff, especially for strategic network and information systems (IS) operations.

Merrill Lynch & Co., Inc. last year signed a $150 million con-

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NETLINE

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NYNEX UNVEILS A PLAN to offer BRI service this fall and PRI in early 1991. Page 2.

NEW BREED OF channel extenders lets user build a mainframe channel network to support remote sites. Page 2.

HP, PACER TEAM UP to offer software that lets minis and workstations act as servers for Macintoshes. Page 2.

DECWORLD '90 preps to showcase key EMA net management software, FDDI and token-ring products. Page 4.

VENDORS SET UP a test lab to ensure interoperability of FDDI LAN products. Page 4.

AD HOC USERS GROUP, LECs defend FCC's decision on Tariff 12, denying that AT&T's offers are discriminatory. Page 7.

NEWSPAPER

FEATURE

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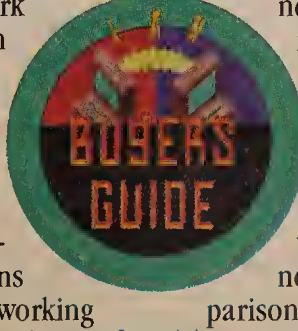
Software options grow with token-ring market

By Edwin Mier
Special to Network World



Although Ethernet had several years' head start in the local-area network marketplace, token ring is unquestionably making up for lost time.

While token ring and Ethernet both reap the benefits of their positions as international networking standards, token ring also profits from its position as IBM's LAN technology of choice. By most industry estimates, the number of token-ring LAN installations is quickly approaching that of installed Ethernets, which are growing at a slower rate.

Token-ring adapter prices, which are dropping rapidly, are now dipping below the $600 level. Ethernet adapters, by comparison, are generally in the $400 range, having dropped sharply from about $1,000

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Nynex offers ISDN rollout plan for BRI, PRI services

RBHC plans to file BRI tariff in October, offer BRI in Boston, N.Y. in December, file PRI tariff next year.

By Bob Wallace
Senior Editor

WHITE PLAINS, N.Y. — Nynex Corp. said last week it will file an ISDN Basic Rate Interface (BRI) service tariff on Oct. 1 and follow with a Primary Rate Interface (PRI) filing early next year.

Pending approval from the New York and Massachusetts public utilities commissions, Nynex's Integrated Services Digital Network BRI service will be offered to users in metropolitan New York and Boston in December.

The service will be supported by AT&T 5ESS and Northern Telecom, Inc. DMS-100 digital switches in 11 New York Telephone Co. central offices and 14 New England Telephone and Telegraph Co. central offices.

The company declined to say when PRI service will become available or where it will be offered.

Roy Ray, associate director for Nynex, said BRI pricing has not been finalized but will be based in large measure on information gleaned from a survey of 110 Nynex customers conducted last year by B.I.S. Mackintosh, Nynex's Luton, England-based research arm.

The Nynex BRI service will be offered with several central office-based features, including caller identification, digital mul-

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Zytron builds remote links with new channel extenders

Firm builds mesh network of mainframe channels.

By Jim Brown
Senior Editor

DALLAS — Zytron Corp. is building a back-end network using a new breed of channel extender that will make it possible to link IBM mainframes at customer locations to host peripherals at any of Zytron's 27 printing and microfiche production centers around the country.

The channel extenders will support some switching functions, enabling the subsidiary of The Dun & Bradstreet Corp. to build a mesh network supporting mainframe channels. Customers with a single extender will be able to access any Zytron site, instead of requiring multiple point-to-point extenders.

Plans to build the net were developed after Zytron started using the technology to support a single customer, NCNB National Bank of Texas. Zytron outfitted NCNB data centers here and in Houston with Computer Network Technology Corp. (CNT) Channelink extenders to route data from NCNB's IBM mainframes over T-1 links to Channelinks in Zytron centers here and in Houston and Austin, Texas.

The Channelink at each Zy-

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HP adds ability for systems to act as servers for Macs

By Laura DiDio
Senior Editor

PALO ALTO, Calif. — Hewlett-Packard Co. and Pacer Systems, Inc. last week said they have ported Pacer's existing Macintosh file, print and terminal-emulation software to run on HP computers.

The agreement will enable HP users — half of which already own Macintosh systems — to integrate the microcomputers into HP's Ethernet-based local-area networks. It will also provide them with the means to share files, electronic mail and printers with other users on the net, according to Duncan Campbell, marketing manager in HP's Colorado Networks Division.

Pacer will offer HP users its PacerLink, PacerShare and PacerPrint software, which will run on HP 9000 Series 300 workstations and Series 800 minicomputers, as well as HP's Apollo Division's DN 2000, DN 3000 and DN 4000 Domain computers configured as file servers.

Joint marketing

Under the terms of the agreement, the PacerShare, PacerLink and PacerPrint software will be sold by Pacer and jointly marketed by both companies.

The PacerLink software is client/server software that enables Macintosh users to emulate asynchronous or Telnet termi-

(continued on page 52)

Briefs

Bad news: the sequel. Microcom, Inc. last week revised its fourth-quarter and year-end results downward, and said it anticipates reporting greater than expected losses for the first quarter ended June 30. The Norwood, Mass.-based firm revised fourth-quarter net income downward from $3.2 million to $1 million. Revenue for the fourth quarter ended March 31 was changed from $21.8 million to $18.25 million.

The company also said it expects to report a loss of between 43 and 48 cents per share for the first quarter on revenue of about $10.5 million. Last month, Microcom estimated it would report a loss of 15 to 20 cents per share on revenue of about $14 million, an announcement that battered the company's stock ("Microcom takes beating on Wall Street after revealing fiscal woes," *NW,* June 18).

Microcom adjusted its fourth-quarter and fiscal year results because of a larger than expected number of product returns from distributors. The company reported $3.5 million in sales to distributors during the quarter. The distributors later did not pay for the equipment and wanted to return it or trade it for other products. Microcom last month said first-quarter results would be below expectations because distributors were trying to sell products they had overstocked in the fourth quarter.

Who needs FDDI anyway? Lawrence Livermore National Laboratory (LLNL) last week said it has awarded Ancor Communications, Inc. of Minnetonka, Minn., an $850,000 contract to build a prototype 1G bit/sec network that will link 30 workstations into two Cray Research, Inc. supercomputers. If the project is successful, LLNL will consider expanding the network to link some 1,700 workstations to the supercomputers. The Livermore, Calif.-based research facility currently uses a 10M bit/sec Ethernet dubbed Octopus to link workstations to the supercomputers and said it wants to leapfrog FDDI, which operates at 100M bit/sec.

A new record. AT&T Bell Laboratories said it set a record last week by sending a light signal more than 6,000 miles using a nascent transmission system that utilizes the metallic rare earth element erbium. Use of the technology is expected to increase capacity of fiber cables severalfold, leading to a reduction in the cost of fiber circuits, but AT&T cautioned that erbium signal regenerators will not be ready for deployment for at least five years.

Metrocast calls it quits. BT US Paging, Inc., a subsidiary of British Telecom, Inc., last week announced that it will shut down its Metrocast radio paging system in 90 days due to tepid demand for the service. Metrocast, which operates in the U.S. and provides a link to the U.K., is 80% owned by BT US Paging. The remaining portion is owned by National Satellite Paging Partners. Metrocast was formed in 1985. Metrocast said it will try to assist customers in moving to alternative paging services.

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Data Communications
Users would be wise to build X.500 directories today even if they do not plan to support the standard in the near future. **Page 13**

Local Networking
John Rose, manager of personal computing systems at DEC, talks about DEC's PC networking strategy for the 1990s. **Page 17**

Management Strategies
Users say they are having trouble realizing some of the promised benefits of EDI because of problems they face in persuading business partners to adopt the technology. **Page 23**

International Networks
The privatization of Argentina's national telephone company will result in better network service if the carrier's new owners comply with strict governmental provisions. **Page 27**

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See The FAXNet Form on Page #30

Vendors build center to test FDDI interoperability

By Bob Brown
Senior Editor

SUNNYVALE, Calif. — A group of 19 Fiber Distributed Data Interface network equipment and chip vendors last week opened a new facility here for testing and certifying interoperability of FDDI local-area network products.

The center will offer a seal of approval to products that pass a suite of interoperability tests. That certification is designed to ease user concerns about interoperability of products based on the soon to be completed FDDI standard.

The $750,000 Advanced Networking Test Center is located on the campus of FDDI chip maker Advanced Micro Devices, Inc. (AMD), which funded the center. The test suites have been partly developed by the Advanced Networking Group, a consortium of 90 FDDI network equipment and chip vendors spearheaded by AMD.

Charter members of the center will form a technical advisory board that will guide the center's staff in writing new test programs for FDDI products.

Nine of these vendors, including cisco Systems, Inc., Proteon, Inc. and Synernetics, Inc., completed the first interoperability tests at the center two weeks ago.

The companies tested their station management offerings and expect to receive certification for those products. Station management is an FDDI document that defines network management for the 100M bit/sec LAN standard.

"[The center's] test programs will form a standard test suite that will help assure users that there is one worldwide FDDI, rather than many FDDIs that cannot interoperate," said Anthony Holbrook, AMD's vice-chairman and chief technical officer.

Sanjay Dhawan, the center's facility manager, said he expects users will make the center's seal of approval a prerequisite for purchasing FDDI products.

A similar sentiment was voiced by David Gallagher, vice-president of marketing at Fiber-Com, Inc., a Roanoke, Va.-based firm that manufactures FDDI bridges and other data communications products.

"The [center] is extremely valuable for both FDDI suppliers and, more importantly, FDDI users," he said. "In addition to performance, FDDI standards are aimed at interoperability, which to a customer means freedom of choice and vendor independence. [The center] is an excellent foundation upon which this freedom of choice can be built and ensured."

Barry Reinhold, manager of the University of New Hampshire (UNH) Interoperability Lab in Durham and a possible future

(continued on page 7)

DEC plans rollout of FDDI, EMA wares at Boston event

DECworld fete will also host token-ring debuts.

By Jim Brown
and Laura DiDio
Network World Staff

BOSTON — Digital Equipment Corp. is expected to release the first version of its integrated network management system, along with its first Fiber Distributed Data Interface and token-ring products, at DECworld '90, which starts here today.

Analysts familiar with the network management announcement said the first version of DEC's VAX-based Management Control Center (DECmcc) Director software, introduced last November as the core software component of its Enterprise Management Architecture (EMA), is being delivered three months ahead of schedule.

The initial version will enable users to manage DECnet Phase IV networks. A second version will feature a graphical user interface and allow users to manage DECnet Phase V networks along with other vendors' equipment. That version will also be demonstrated next week but is not scheduled to ship until DECnet Phase V is available later this year, analysts said.

Delivery of DECmcc Director complements the existing DECmcc Management Station, a net management console also introduced last November, and it is a major step toward filling out EMA.

"DEC is working very hard to show it has made progress in a relatively short period of time in actually implementing the architecture and concepts of EMA," said James Herman, a principal at Northeast Consulting Resources, Inc. in Boston.

DECmcc Director is used to collect data from DEC's and other vendors' products and merge it into a single data base. DEC and other vendors must write DECmcc Director software called access modules to provide the interface between DECmcc Director and other products.

At least three of the 13 third-party vendors in DEC's EMA Strategic Vendor Program are expected to demonstrate access modules at DECworld '90.

Codex Corp. is expected to show off an access module that enables DECmcc Director to access data stored on its 9800 Series network management system, which monitors and controls such devices as modems and multiplexers.

StrataCom, Inc. is expected to demonstrate an access module enabling DECmcc Director to monitor and control its IPX T-1 multiplexers, and TSB International, Inc. will display an access module that lets DECmcc Director collect traffic data and alarms from a mix of vendors' private branch exchanges.

FDDI, token-ring support

Sources within DEC last week said the company's suite of 100M bit/sec FDDI products will include an Ethernet-to-FDDI bridge, an FDDI wiring concentrator and an adapter board that can link computers to an Ethernet or FDDI network.

The Ethernet/FDDI adapter is based on a chipset DEC jointly developed under an agreement signed with Motorola, Inc. last September. It will enable users to switch from 10M bit/sec Ethernet to 100M bit/sec FDDI speeds, according to a DEC spokesman.

The introduction of a dual-function Ethernet/FDDI adapter would make DEC the first vendor to ship such a product, said John Dunkle, vice-president of WorkGroup Technologies, a market research company in Hampton, N.H.

While the new Ethernet-to-FDDI bridge was developed in-house, DEC will resell Waltham, Mass.-based Chipcom Corp.'s ONline System Concentrator, according to Frank Fuller, senior product manager at Chipcom.

The ONline System Concentrator, which began shipping in April, includes a chassis with 17 slots that support interfaces to Ethernet, 4M and 16M bit/sec token ring, and 100M bit/sec FDDI nets based on shielded and unshielded twisted-pair wiring and fiber-optic media.

However, Fuller said, the FDDI interface will not be available until sometime next year. He added that DEC will sell the device for $4,450, the same price that Chipcom charges.

John Rose, the company's manager of personal computing systems, last week said DEC plans to resell 4M/16M bit/sec token-ring adapters for its VAX line and added that it will also release an Ethernet-to-token-ring router.

Rose declined to divulge the name of the token-ring adapter vendor, but sources close to the company said the supplier is Simpact Associates, Inc.

New DEC VAX can be LAN server, multipurpose mini

VAX 4000 offers mainframe-class memory and I/O technology, supports more than 200 PCs.

By Tom Smith
New Products Editor

BOSTON — Digital Equipment Corp. will announce at DECworld '90 here this week a low-end VAX processor that can be configured as a LAN server or as a multipurpose minicomputer in DECnet environments.

Doubling the performance of the high-end MicroVAX 3800 and 3900 processors, the VAX 4000 Model 300 is rated at 8 VAX Units of Performance, which is roughly equal to 8 million instructions per second.

The system offers up to 15G bytes of hard disk storage using sophisticated mainframe-class technology; it also offers mainframe-level I/O handling features.

The 100% performance improvement over the high-end MicroVAX shows "DEC is damned serious about making VMS competitive with other platforms," said Terry Shannon, director of the DEC Advisory Service at International Data Corp. in Framingham, Mass.

When configured as a local-area network server in DECnet networks, the VAX 4000 Model 300 can function as a data base, file or compute server for as many as 220 personal computers running manufacturing, imaging and engineering analysis applications, according to Brian Austin, commercial market development manager at DEC.

Packaged with DEC LanWorks software, the server supports OS/2, DOS and Macintosh workstations.

Another software component bundled with the server, VMS/Ultrix Connection, supports Transmission Control Protocol/Internet Protocol and Sun Microsystems, Inc.'s Network File System, enabling the server to support Unix workstations.

The new VAX also comes with VAXcluster, which is software for resource sharing with other VAXes, and VAX Rdb/VMS, an SQL data base for interacting with terminals or other servers.

The VAX 4000 Model 300 comes with 32M bytes of system memory, expandable to 128M bytes. It can support total disk storage of 10.6G bytes or, through a combination of previous- and current-generation disk drives, up to 15G bytes.

The Model 300 has seven Q-bus slots available for network interfaces, such as disk controllers and Ethernet adapters.

Residing on the server's CPU board are the VAX's proprietary microprocessor, an Ethernet controller and two Digital Storage Systems Interconnect (DSSI) controllers. The Reduced Instruction Set Computer-based DSSI controllers have direct access to memory, and each is capable of performing 800 I/Os per second, for a total of 1,600.

This shows "DEC is damned serious about making VMS competitive with other platforms," said IDC's Terry Shannon.

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"That means there's significant room for growth or expansion on those channels for newer, higher technology disk or tape devices" because current storage technology cannot support such a high I/O rate, Austin explained.

DSSI's dual role

In addition to a LAN server, the Model 300 can be configured as a dual host, and users that are connected to the primary host can be cut over to an attached backup in the event of a failure.

DSSI controllers are an integral component in the system's dual-host configuration. DSSIs link the disk drive of one VAX

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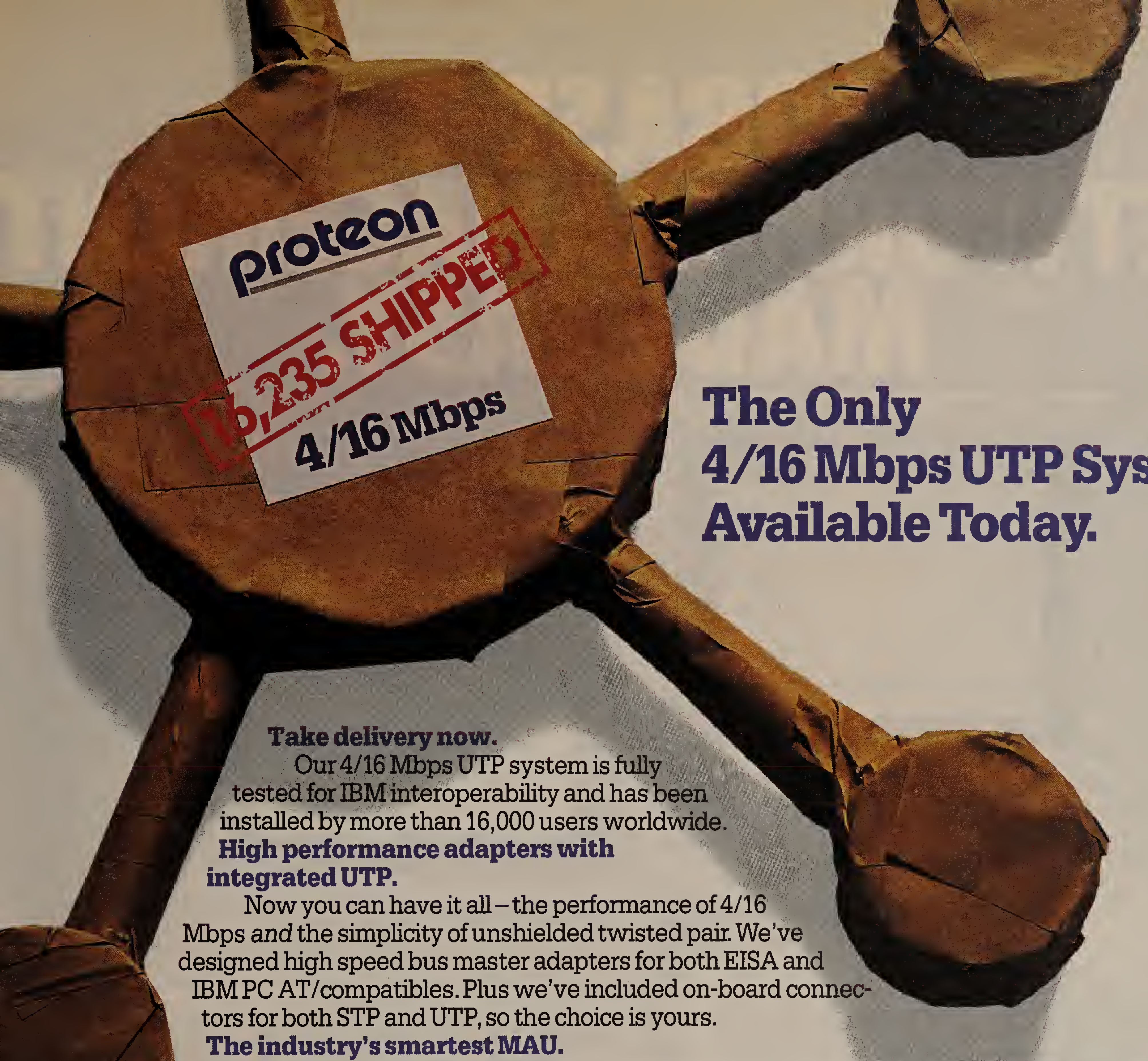
Corrections: Infonet Services Corp.'s international value-added network, referenced in the May 21 story "Good news on the global front," is based on equipment from Network Equipment Technologies, Inc. and NCR Comten.

The story, "PCN firms grapple with bandwidth issues" (*NW*, June 25) should have stated that PCN America, Inc. was granted a license to trial a personal communications network service in the 1.85- to 1.99-GHz range, which is also shared by microwave users.

Also, the article incorrectly stated the bandwidth ranges reserved for users in the government and broadcast auxiliary bands.

The U.S. government uses bandwidth between 1.71 GHz and 1.85 GHz, and broadcast auxiliary bands operate at 1.99 GHz to 2.1 GHz.



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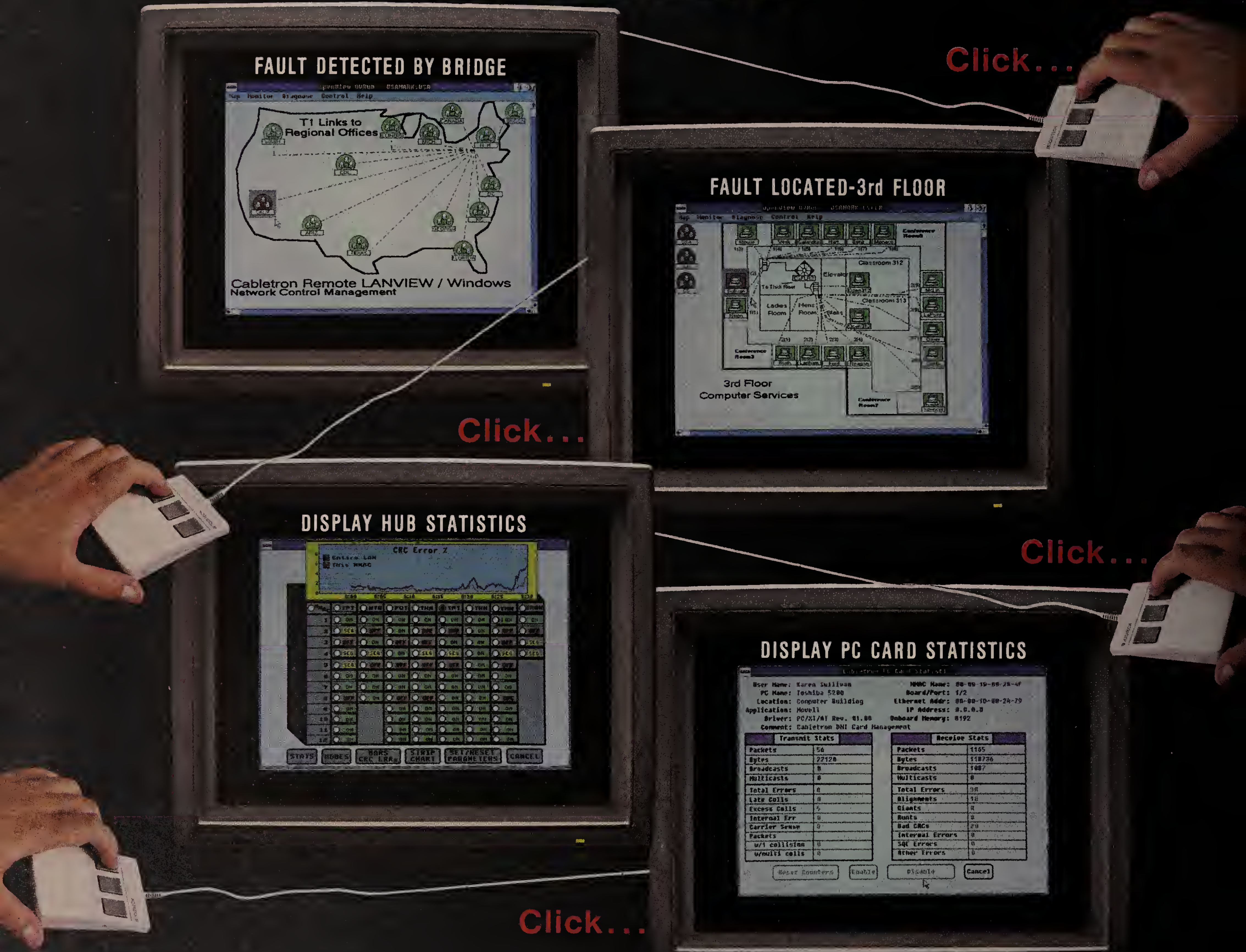

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Users group, Bell companies stand behind FCC on Tariff 12 decision

Ad Hoc Telecom Committee claims tariff meets users' needs.

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — The Ad Hoc Telecommunications Users Committee and several local exchange carriers last week came to the defense of the Federal Communications Commission's recent AT&T Tariff 12 decision, which is now facing an appeals court challenge.

In statements submitted to the U.S. District Court of Appeals for the District of Columbia, the Ad Hoc users group said AT&T's Tariff 12 represented a response to customer needs that cannot be met with separate tariffs. In addition, the local exchange carriers stated in their court filing that they will suffer if the court rules against Tariff 12.

Last fall, the FCC declined to review its April 1989 Tariff 12 decision, in which it had concluded that custom packages put together under the tariff are not like the sum of their tariffed components and thus may be priced differently. Under Tariff 12, AT&T is allowed to combine tariffed services into discounted offerings for large business customers.

Backdoor deregulation

The Independent Data Communications Manufacturers Association, Inc., MCI Communications Corp. and US Sprint Communications Co. appealed the FCC decision, charging that Tariff 12 represents unreasonable discrimination in pricing.

MCI maintains that Tariff 12 packages are customer-specific, a violation of the FCC rules and those of the Communications Act of 1934. Also, the carrier says Tariff 12 constitutes "backdoor" deregulation of AT&T.

In its arguments in favor of Tariff 12 filed with the court last week, the Ad Hoc Committee said AT&T's general tariffs cannot satisfy the complex network needs of individual customers because the rates frequently change, making network planning difficult.

Because Tariff 12 packages enable customers to manage their networks with greater long-term stability, the tariff is not like the component services used in Tariff 12 deals, the Ad Hoc users group said. The group added that AT&T's competitors still frequently win bidding contests against Tariff 12 offers.

The committee said its position represents the views of American Airlines, Inc., American Express Co., Boeing Com-

(continued on page 54)

Vendors build center to test FDDI

continued from page 4

FDDI user, applauded the FDDI center's certification program.

"The seal should help users buy with more confidence," he said.

Reinhold noted that the goals of the AMD center are similar to those of an FDDI consortium recently announced at UNH that began testing FDDI products last week ("Vendors team up to ensure interoperability of FDDI," *NW,* April 30).

The UNH FDDI Consortium has no definite plans to offer a seal of approval. It is part of a broader based interoperability testing effort being undertaken at UNH that includes a 10BaseT interoperability testing program. A Simple Network Management Protocol vendor group will be formed at a later date, Reinhold said.

Forrester Research projects that the U.S. market for FDDI products will be about $453 million in 1995.

▲▲▲

The efforts of both groups illustrate the growing interest in the FDDI market, analysts said. Forrester Research, Inc., a Cambridge, Mass.-based market research firm, projects that the U.S. market for FDDI products will be about $453 million in 1995, up from $35.5 million this year.

Users interested in the activities of the new FDDI interoperability center here are welcome to join. But some observers said the $15,000, two-year membership fee is prohibitive.

The center plans to issue a quarterly newsletter to update users on its activities, an AMD spokeswoman said.

In addition to AMD, the center's founding charter members include: cisco Systems; CMC, a Rockwell International Co.; Codenoll Technology Corp.; FiberCom; Fibermux Corp./Sumitomo Electric Industries, Ltd. (joint membership); Hewlett-Packard Co.; In-Net Corp.; Interphase Corp.; Martin Marietta Aero & Naval Systems Co.; Network Peripherals, Inc.; Network Systems Corp.; Proteon; Schneider & Koch & Co. Datensysteme GmbH; Sun Microsystems, Inc.; Synernetics; SynOptics Communications, Inc.; Timeplex, Inc.; and Ungermann-Bass, Inc.

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INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

Worth Noting

> "The RBHCs may be going overseas to teach, but they may find out they have some things to learn."
>
> **Patrick Springer**
> Director of telecommunications industry services
> Telecommunications Management Consultants
> Needham Heights, Mass.

People & Positions

Donald Casey, former vice-president of networking and engineering at Apple Computer, Inc., recently was named vice-president of **Lotus Development Corp.**'s newly unified spreadsheet division, effective July 15.

Casey will oversee development and marketing for Lotus' spreadsheet products, including those for personal computers, Unix workstations, minicomputers and mainframes. He will report to **Frank King,** senior vice-president of Lotus' Software Business Group.

For the past two years, Casey has been responsible for Apple's networking and communications strategy and products. Prior to Apple, Casey held various management positions during his 21-year career at IBM.

Subhash Bal recently was named vice-president of marketing at **Micom Communications Corp.**, a Simi Valley, Calif.-based maker of local- and wide-area network equipment.

Bal will be responsible for overseeing the marketing programs for Micom's LAN and WAN product lines, including X.25 and voice/data integration products. He will report to **Gil Cabral,** Micom's president.

Previously, Bal was vice-president of marketing for Touch Communications, Inc., a Campbell, Calif.-based software firm. He also served as vice-president of marketing for Excelan, Inc., the LAN maker that was acquired by Novell, Inc. last year. ☑

AT&T asks FCC to rethink its denial of SDN/800 plan

Users write letters in support of carrier's case.

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — AT&T, backed by several of its major corporate customers, is urgently pressing the Federal Communications Commission to reverse its June decision rejecting a combined Software-Defined Network (SDN) and 800 service volume discount plan.

AT&T recently asked the FCC for a review of the decision, saying it is rapidly losing business because the tariff was rejected. The proposed AT&T tariff would have allowed customers to combine their SDN and 800 service usage for greater volume discounts.

Last month, the FCC rejected the proposal because it covered services that fall into two separate baskets under price cap regulations.

In its price cap order last year, the FCC decided that the lack of portability of 800 numbers made 800 services less competitive than other business services.

The FCC determined that this added up to an unfair advantage for AT&T, which provides more than 80% of all interstate 800 services. The separate 800 basket ensures that decreases in charges pertain only to 800 services.

AT&T told the FCC that the tariff rejection has already cost it $5.8 million in business from the Blue Cross Blue Shield Association. To underscore its belief that it is "at a serious and unfair disadvantage," AT&T recently filed with the FCC several letters written on its behalf by large companies and a major user association.

In those letters, users stated that long-distance competitors such as MCI Communications Corp. and US Sprint Communications Co. are offering volume discounts combining virtual private network and 800 service usage.

The letters were written by network managers at American Cyanamid Co., Caterpillar, Inc., Control Data Corp., Corning, Inc., Dresser Industries, Inc., Emery Worldwide, Hewlett-Packard Co., Lockheed Corp., Monsanto Co., Navistar International Transportation Corp., Summit Information Systems Corp. and the SDN Users Association, Inc., which represents 280 companies.

The letter writers urged the FCC to permit AT&T to offer its SDN/800 combination plan because it would lower costs, allow for sharing of access facilities and provide for unified administration and billing of SDN and 800 services.

In one of the strongest statements, Dick Roesler, corporate telecommunications manager at American Cyanamid, told FCC Chairman Alfred Sikes that the FCC should not stand in the way of progress and should allow AT&T to offer the plan to give customers a choice of competitive alternatives.

Roesler said American Cyanamid could save more than $225,000 if the SDN/800 volume usage plan were approved. ☑

INDUSTRY BRIEFS

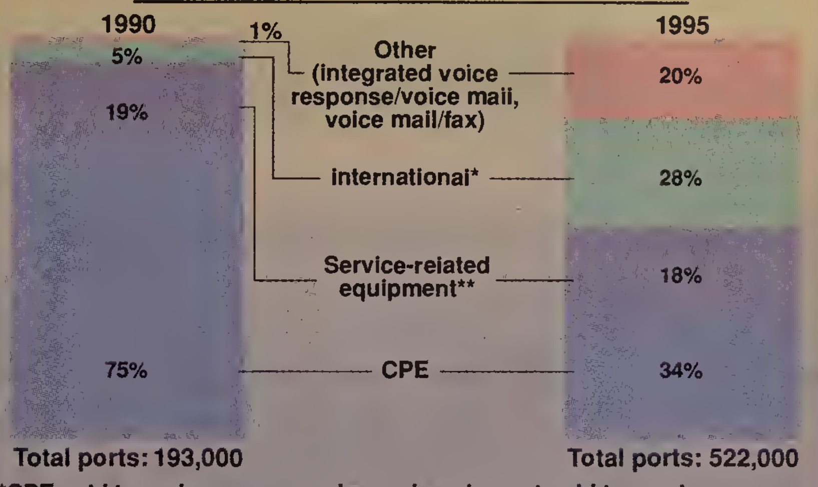
Interlink Computer Sciences, Inc. last week said it has entered into an agreement with **IBM** under which IBM will sell Interlink's SNS/SNA Gateway products, which allow transparent connectivity between IBM System/370 mainframes and the computers in a Digital Equipment Corp. DECnet network.

SNS/SNA Gateway products provide bidirectional file transfer, terminal-emulation and security features. The products also make it possible to route DECnet data over Systems Network Architecture nets, provide NetView control of SNA and DECnet networks, and perform tape backup from DECnet devices to IBM tape drive systems.

IBM will market the products to customers in the U.S., Canada and Puerto Rico. Interlink said additional marketing agreements with IBM will be announced in coming weeks.

Olivetti Systems and Networks, a division of Ing. C. Olivetti & Co., S.p.A., last week signed a reseller agreement with **Fibronics International, Inc.** for modems, token-ring offerings and multiplexers in Fibronics FACS Network Distribution System line. Under the 15-month nonexclusive agreement, Olivetti will sell Fibronics products under its own label. ☑

Voice mail shipment forecast



*CPE sold to end-user companies and equipment sold to service providers overseas.

**Voice mail equipment sold to voice mail service providers, such as carriers.

GRAPHIC BY SUSAN SLATER

SOURCE: PROBE RESEARCH, INC., CEDAR KNOLLS, N.J.

Voice mail vendors widen their horizons

By Bob Brown
Senior Editor

Faced with the prospect of slowing sales of their traditional offerings, voice mail vendors are moving to provide products supporting integrated voice mail, voice response and facsimile capabilities, among other features.

Users and analysts say that a growing number of companies are shopping for integrated systems that offer more than just message store-and-forward capabilities. They say a single system that offers voice mail, voice response and other features would be easier to manage than standalone products and would enable them to offer better service to employees and customers.

The voice mail equipment and service market has grown at more than 50% annually for each of the past three years, an increase fueled primarily by customer premises equipment growth. But sales of that equipment are expected to flatten by 1992, according to Chris Seelbach, a senior analyst at Probe Research, Inc., a market research firm based in Cedar Knolls, N.J.

In contrast, he said, the market for integrated voice mail/voice response systems is expected to explode.

Seelbach predicted that the interactive voice response/voice mail/fax response customer premises equipment market will skyrocket from 1% of the overall ports sold today to about 20% of ports sold in 1995 (see graphic).

Voice mail vendors are rolling out "application platforms" — offerings that support voice mail, voice response, fax response and other applications in a single hardware/software system.

VMX, Inc., for example, announced in May VMXworks — hardware and software tools that enable users of VMX's voice mail systems to design a system that lets callers conduct voice and information transactions during a single phone call.

Other voice mail vendors are bolstering their basic voice mail offerings.

In April, for example, voice mail vendor Centigram Communications Corp. finalized its purchase of Speech Plus, a seller of voice synthesis and voice response systems. Centigram plans to integrate the capabilities of Speech Plus' product line into Centigram's voice-messaging offerings.

"It's all coming together fast," said Roger Benson, who manages Eastman Kodak Co.'s voice processing network under part of a highly publicized outsourcing agreement for Digital Equipment Corp. in Rochester, N.Y. "Users will be able to increase productivity by tying together voice response, voice mail and fax systems."

With a combination voice mail/voice response/fax response system, for example, bank customers could call in to a voice response system, have a mortgage application faxed to them and leave a voice mail message with a mortgage officer.

Lisa Stockberger, a vice-president at Vanguard Communications Corp. in Boston, said, "The trend is for vendors to give users what they need to manage everything from a single point — what we refer to as voice mainframes."

According to Rob Reid, director of marketing at Octel Communications Corp., "As voice mail vendors, we have to ask ourselves if we are in the telephone answering industry or the voice information industry," he said. ☑

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Worth Noting

AT&T's latest rate reductions, which total $300 million and took effect last week, represent the carrier's 11th rate cut in the last 6½ years. AT&T has cut long-distance prices by 43% since divestiture.

Carrier Watch

The Kroger Co., a $19.1 billion U.S. food retailer, recently awarded **US Sprint Communications Co.** a three-year, $15 million contract for a 2,562-site Virtual Private Network (VPN).

With the contract, US Sprint becomes Kroger's primary carrier, accounting for roughly 95% of the firm's voice traffic. The VPN will replace existing MCI Communications Corp. services as well as services provided by AT&T. The net will link Kroger's Cincinnati headquarters to 1,234 supermarkets, 1,000 convenience stores and 38 food processing plants across the country, and will support features such as uniform seven-digit on-net dialing.

Melville Corp., a large specialty retailer based in Harrison, N.Y., recently awarded **MCI Communications Corp.** a three-year, $12 million contract for Virtual Network (Vnet), 800, calling card and digital data services.

The 7,000-site Vnet will link Melville's headquarters in Harrison with subsidiaries CVS Drugs, Kay-Bee Toy and Hobby, Linen 'n Things, Marshalls, Inc. and Thom McAn Shoe Co. across the U.S.

John Mitchell, chief information officer for Melville, said, "By unifying our telecommunications needs under a single supplier, Melville expects to achieve a more cost-effective network and substantially improve network management."

Melville said intracompany communications is the key to

(continued on page 12)

AT&T's Tariff 12 users

Virtual Telecommunications Network Service

Option	Customer	Minimum annual charges	Minimum service (years)
1	E.I. du Pont de Nemours & Co.	$13.2m	3
2	Ford Motor Co.	$17.4m	5
3	American Express Co.	$47.6m	3
4	American Airlines, Inc.	$33.3m	5
5	Federal Express Corp.	$14m	3
6	Allied-Signal, Inc.	$9.8m	4
7	General Electric Co.	$60m	5
8	First Chicago Corp.	$5.5m	5
9	Combustion Engineering, Inc.	$2.7m	3
10	GE	$2.2m	5
11	The Prudential Insurance Co. of America	$25m	5
12	PaineWebber, Inc.	$10m	5
13	Kemper Corp.	$7m	5
14	J.C. Penney Co., Inc.	$31.8m	5
15	MasterCard International, Inc.	$5.8m	3
16	Unisys Corp.	$16.1m	5
17	RJR Nabisco, Inc.	$6.3m	3
18	James River Corp. of Virginia	$3.8m	5
19	National Semiconductor Corp.	$3.4m	3
20	Undisclosed	$14.8m	3
21	Citibank, N.A.	$12m	3
22	Aetna Life and Casualty Co.	$10m	3
23	Chemical Bank	$4m	3
24	Electronic Data Systems Corp.	$27m	5
25	The Hertz Corp.	$9.1m	5
26	USAir, Inc.	$22.6m	5
27	Primerica Corp.	$17.1m	3
28	Litton Industries, Inc.	$4.1m	3
29	du Pont	$12.3m	3
30	Cigna Corp.	$16.3m	5
31	Marriott Corp.	$23.6m	5
32	Colonial Penn Group, Inc.	$3.1m	3
33	Firestone Tire & Rubber Co.	$6.5m	3
34	CSX Corp.	$9.9m	3
35	Nestle Foods Corp.	$5.2m	3
36	Metropolitan Life Insurance Co.	$26.5m	5
37	Atlantic Richfield Co.	$3.8m	5
38	Undisclosed	$5.2m	3
39	Undisclosed	$10m	3
40	General Dynamics Corp.	$3.6m	3
41	Boise Cascade Corp.	$5.2m	5
42	Caterpillar, Inc.	$4.8m	5
43	McGraw-Hill, Inc.	$5.3m	3
44	Undisclosed	$13.8m	5
45	Anheuser-Busch Companies, Inc.	$3.4m	4
46	Undisclosed	$9m	5
47	Undisclosed	$7.4m	3
48	Xerox Corp.	$20.8m	5
49	Goldman, Sachs & Co.	$4.9m	3
50	Security Pacific Corp.	$7.3m	3
51	Multiuser contract*	$92.3m	3
52	Undisclosed	$15.1m	3

***Former AT&T Enhanced Private Switched Communications Service customers including Xerox, LTV Corp., USX Corp., Aluminum Co. of America, Consolidated Rail Corp., ICI Americas, Inc., PPG Industries, Inc. and Quantum Chemical Corp.**

GRAPHIC BY SUSAN SLATER   SOURCE: GARTNER GROUP, INC., STAMFORD, CONN.

Top carriers take steps to define role of aggregators

By Mark Langner
Special to Network World

The top three long-haul carriers have recently taken steps to restrict resale of their services by long-distance aggregators.

In sweeping tariff revisions, US Sprint Communications Co. and MCI Communications Corp. have attempted to distance themselves from aggregators and make it harder for aggregators to profit from the resale of their services, while AT&T has been restricting the use of its trademark.

US Sprint, in a recent Virtual Private Network (VPN) tariff filing with the Federal Communications Commission, included a provision that requires aggregators to verify in writing that they assume full financial responsibility for every customer.

The carrier also barred aggregators from using US Sprint's name or logo in any promotional materials, contracts and bills without written authorization, and it has filed multiple tariff changes to further shield its products from aggregation.

In essence, US Sprint made VPN more like AT&T's Software-Defined Network (SDN) by segmenting it into a high-end and low-end product, called Option I and Option II.

The low-end service will be most attractive to aggregators. Option II has a 5% minimum on-net-to-on-net requirement that is tough for many service aggregators to meet. Aggregator customers have mostly on-net-to-off-net or off-net-to-off-net traffic.

However, US Sprint also adopted fundamental rate changes for both Options I and II,

(continued on page 12)

Langner is a senior associate at TeleChoice, Inc., a Manchester, Conn.-based consultancy.

NEC Rescue supplies PBXs in emergencies

Users' interest may spark company to extend program to cover multiple, not just single, sites.

By Bob Wallace
Senior Editor

MELVILLE, N.Y. — At the behest of its national users group, NEC America, Inc. recently created a program under which it will provide private branch exchanges on an emergency basis to replace switches lost in disasters.

NEC said it would provide customers that join the program, dubbed Rescue, with an NEAX 2400 IMS preconfigured with 300, 500 or 700 ports usually within 24 hours of a failure.

In the event of a disaster, customers call NEC's Rescue Center in Dallas, which is staffed 24 hours a day, 365 days a year. The center will dispatch a replacement switch and an NEC technician to the customer site, and will help install the device in a customer-provided alternate switch room. The technician remains on-site for 48 hours after the backup switch is cut over.

Roger McKenzie, technical operations director for NEC, said the company surveyed almost 300 attendees at the 1989 NEAX 2400 Users Group annual meeting in New Orleans to measure interest in a switch replacement program and received more than 150 responses. He said 23 NEC customers have submitted written requests to join the program.

"The original idea was to tailor the program for customers with one or more [PBXs] at a single site," McKenzie said. "But, based on the response we've received, we may expand the program to cover customers with switches at multiple sites."

Switches provided under Rescue will be equipped with 25%

(continued on page 12)

WASHINGTON UPDATE

BY ANITA TAFF

Telecom industry employment figures down. Employment in the telecommunications service and equipment industries continues to slide as it has done almost every year since divestiture. A new study by the Computer and Business Equipment Manufacturers Association (CBEMA) shows that 9.5 million people were employed in the industry as of April 1990. As of April 1989, 9.9 million people worked in the field, down from 10.1 million in April 1988.

Employment trends for the whole information technology industry were the reverse of the telecommunications sector, rising 1.6% since April 1989. The information technology industry includes office machines, computers and business forms producers in addition to telecommunications equipment vendors.

AT&T offers Tariff 15 to cookie company. AT&T has filed its eighth plan under Tariff 15, this one for the Original Cookie Co., a division of Midial, Inc. The offer, made in response to a deal US Sprint Communications Co. made in an effort to win Original Cookie's business, would give the the company a $20,000 credit if it signs up for new or additional Software-Defined Network or Megacom 800 service. AT&T said it would offer the same deal, which requires a two-year commitment, to any user who could show it was offered a similar credit or discount by rival carriers before May 1990.

The future of AT&T's Tariff 15 is uncertain. One deal offered under the tariff was judged unlawful by the Federal Communications Commission, AT&T withdrew another amid reports the FCC was going to reject it, and the FCC recently suspended a deal for CBS, Inc. to investigate its lawfulness. The FCC has allowed only one Tariff 15 deal — for Resorts Condominium International, Inc. (RCI) — to take effect after investigating the plan for five months and not reaching a decision on its lawfulness. That means the FCC could reopen the issue and find the RCI deal unlawful at any time.

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Carriers take steps to define aggregators

continued from page 11

which, when combined with volume discount plan changes, squeezes the margins that would make VPN Option I attractive for aggregation.

As a result of the changes, all but the smallest users — those that spend less than $5,000 per month — would be better off getting VPN on their own instead of through an aggregator.

Much of the battle over aggregation is being fought in definitions. In one recent tariff filing, MCI created new definitions of customer locations for "certain multilocation services or service options." All customer sites must now be designated as either a Location Type A or Location Type B.

The Location Type A label applies to customer locations that are owned, leased or otherwise controlled directly or indirectly by the customer. MCI requires that Location Type A sites be at least 20% owned by the customer. Location Type A accounts are MCI customers, billed by MCI and responsible for payment to MCI.

Location Type B denotes all other locations. Any customer having locations classified as Location Type B must provide all billing to these locations, accept all financial responsibility for bill payment, provide all customer service for these locations, and not use MCI's name, service mark or trademark without MCI's written consent.

The MCI Location Type A and B definitions weave a new pricing mechanism throughout its WATS and virtual network pricing tariff as well. Basically, MCI's new tariff says that if an aggregator tries to use MCI's services, the customer will be deemed a Location Type B customer and, therefore, subject to higher rates. The differences can be significant.

The result of these changes are to increase the cost of an aggregator bringing unrelated sites onto an MCI discount plan. In applying location fees, MCI can decrease the effective margins that aggregators can offer their customers.

AT&T limits logo usage

AT&T has moved to severely restrict unauthorized use of its logo in the resale of its services — SDN in particular. Aggregators have been extremely loose in their representation of their relationship with AT&T. Some aggregators have claimed to be such things as "funded by AT&T," "endorsed by AT&T" or "partners with AT&T."

> In applying location fees, MCI can decrease the effective margins that aggregators can offer their customers.
>
> ▲▲▲

AT&T has sent letters to SDN resellers outlining strict guidelines on using the AT&T logo in marketing programs. In addition, AT&T said it has continued to revoke marketing arrangements with aggregators that it thinks are now competing for some of its own direct sales accounts. ◘

NEC Rescue supplies PBXs in emergencies

continued from page 11

digital and 75% analog station line cards and primarily analog trunk cards. "We decided on these percentages because they reflect the average configuration of the survey respondents' current switches," McKenzie explained.

Users pay a basic subscription charge based on the configuration of the backup switch. A 300-port NEAX 2400 costs $7,500 a year, a 500-port switch costs $10,000, and a 700-port NEAX 2400 costs $12,500. NEC offers a $500 per-subscription payment discount for users that pay the subscription fee in a lump sum.

Users are also charged a onetime $1,000 data base programming fee for the design of a contingency data base that lists key stations, feature and trunk assignments, and other related information needed to enable critical departments to carry on business.

Customers can use the replacement switches free of charge for 14 days but must pay $1,000 a day rental fee per switch for each subsequent day. NEC will waive the rental fee if the customer orders another NEAX 2400 within 14 days.

Customers that subscribe for two to five PBXs get a 10% discount on the basic charge for the switches. Customers that sign up for six to 10 systems get a 10% discount on the first five and a 20% discount on the rest. NEC said it will negotiate individual discounts with customers that subscribe for 11 or more switches.

For more information, contact Rescue Disaster Recovery Services, NEC America, Business Systems Sales Division, 1340 Walnut Hill Lane, Irving, Texas 75038, or call (214) 518-4442. ◘

Carrier Watch

continued from page 11

victory in the retail industry. "Our ability to satisfy our customers will depend on fast, reliable communication between the stores, distribution facilities, merchandise offices and our suppliers worldwide."

Hardee's Food Systems, Inc., a fast-food restaurant chain based in Rocky Mount, N.C., recently awarded **US Sprint Communications Co.** a contract to provide long-distance services from pay phones at 1,500 Hardee's restaurants nationwide. US Sprint said the deal is expected to generate over $2 million a year for the carrier.

Under the agreement, US Sprint will carry all 0+ and operator-assisted long-haul calls. Public pay phone service requires full operator service capabilities, credit card verification and billing.

The **Federal Communications Commission** recently issued a Notice of Inquiry on personal communications services in which it is asking for public comment on how new digital cellular services and personal communications networks should be regulated. The FCC said the emerging wireless technologies promise "significant improvements in communications capabilities," adding that it wants input on technical standards for the new industries. Comments are due Oct. 1. ◘

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DATA COMMUNICATIONS

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Worth Noting

"Apple has limited resources. So when it comes to playing in the corporate market, it is going to need a lot more strategic partners."

Tim Bajarin
Executive vice-president
Creative Strategies
Research International
Santa Clara, Calif.

Data Packets

Hewlett-Packard Co. last week released an enhanced version of its Real-Time Applications Platform (RTAP) software called RTAP/Plus.

The software will enable programmers to build network-based industrial monitoring applications that acquire control data from factory floor devices made by Allen-Bradley Co., HP and Modicon, Inc. in order to make sure they are operating within user-defined parameters.

For instance, applications built with RTAP/Plus ensure that a programmable logic controller (PLC) or a remote terminal unit (RTU), which together control the operation of robots, valves and pumps, is operating in accordance with an application.

Applications developed with RTAP/Plus run on HP 9000 workstations under HP-UX, HP's version of Unix. The workstations must be attached to Transmission Control Protocol/Internet Protocol-based Ethernets. The new version lets programmers build control applications that log alarms received from PLCs or RTUs. It also supports a trend analysis module that enables users to capture and graphically display historical information from RTAP's existing data base module.

The license fee for an RTAP/Plus developer's tool kit is $31,000; the license to run applications developed with the tool kit costs $15,000.

Firm's devices to support data traffic over ISDN lines

Wares include host access unit, bandwidth mgr.

By Jim Brown
Senior Editor

SAN FRANCISCO — Start-up Ascend Communications, Inc. is developing a pair of products that will exclusively support data applications running over Integrated Services Digital Network lines.

Ascend was founded 1½ years ago by four former Hayes Microcomputer Products, Inc. employees who developed Hayes' microcomputer-based ISDN terminal adapter. The firm said it plans to ship its ISDN products this fall.

Neither product has been named, but the company said one is a device located in a data center that will provide host access for multiple microcomputers or terminals attached over Basic Rate Interface (BRI) or Primary Rate Interface (PRI) circuits. The device will obviate the need for individual ISDN terminal adapters at the host site.

The other product is an ISDN bandwidth manager that works in pairs to establish ISDN connections between local-area network bridges or videoconferencing units on a dial-up basis, rather than using a leased line.

Analysts said the data center access device will appeal to users, such as retailers, who want to implement BRI services to reduce their reliance on the slow analog dial-up circuits currently used to collect sales information from remote locations.

"Thank goodness somebody is finally thinking of ISDN in terms of a data-only scenario," said Mark LaRow, a consultant with Ernst & Young's Network Strategies, a Fairfax, Va.-based consulting firm. "Up to now, ISDN has really been the domain of the voice people."

The access device is a rack-mountable unit supporting a mix of BRI or PRI boards that provide access to ISDN services and RS-232 or V.35 boards supporting links to one or more hosts. The device also supports token-ring or Ethernet adapter boards in order to provide access to LAN-attached hosts.

Since the product is still under development, the company declined to disclose the number of ISDN circuits or host and LAN interfaces the device will support.

(continued on page 14)

Better modems may stave off exodus to digital lines

By Jim Brown
Senior Editor

NEW YORK — Although the cost for digital data circuits is nearing that for analog leased lines, users will not migrate to digital facilities over the next four years as quickly as some predict, according to a recent report by Frost & Sullivan, Inc.

The report, titled "The U.S. Market for Leased Line Modems," concludes that sinking costs for modems and development of modulation techniques enabling modems to support speeds greater than the theoretical limit of 19.2K bit/sec will encourage users to move up to high-speed modems.

However, the continuing decline in prices and increased availability of digital offerings, such as Integrated Services Digital Networks, will encourage some users to give up on modems, said Gilbert Held, a telecommunications consultant in Macon, Ga., who authored the report.

Held's conclusions are based on interviews with major modem manufacturers and responses to a survey of 5,000 users.

The report estimates that the installed base of leased-line modems supporting speeds of 14.4K bit/sec and above will increase over the next four years, while those supporting 9.6K bit/sec and lower will drop off.

For instance, while 80.5% of leased-line modems installed in 1989 supported speeds of 9.6K bit/sec and lower, this category will only account for 42.2% of the installed based by 1994 (see graphic, page 14).

This is contrasted with the increase in the use of modems supporting 14.4K bit/sec and higher from 19.5% of the installed base of leased-line modems in 1989 to 57.8% in 1994.

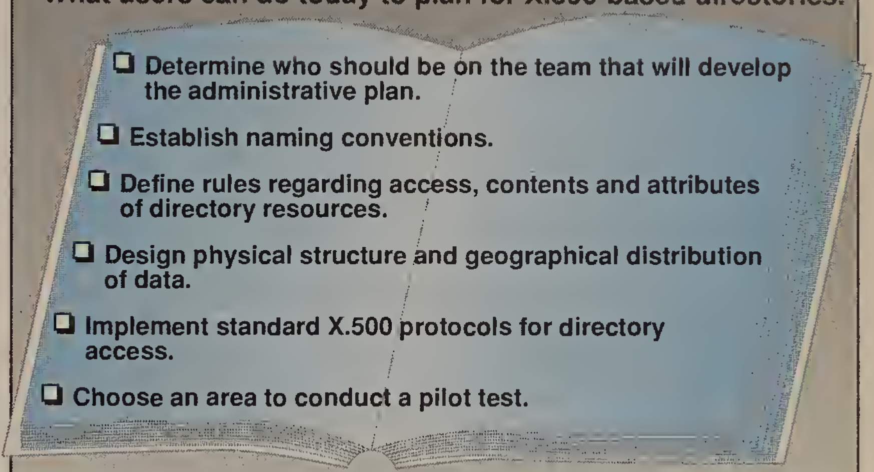
New and improved modems

According to Held, one factor that could deter a massive migration to digital facilities is the development of modulation techniques that will push throughput on analog leased lines beyond 19.2K bit/sec.

(continued on page 14)

Getting started with X.500

What users can do today to plan for X.500-based directories.



☐ Determine who should be on the team that will develop the administrative plan.

☐ Establish naming conventions.

☐ Define rules regarding access, contents and attributes of directory resources.

☐ Design physical structure and geographical distribution of data.

☐ Implement standard X.500 protocols for directory access.

☐ Choose an area to conduct a pilot test.

GRAPHIC BY SUSAN SLATER

SOURCE: *NETWORK WORLD*

Prepping for X.500 pays off in long run

Experts advise users to support X.500 naming conventions, build project team well in advance.

By Paul Desmond
Senior Editor

Users can begin preparing today to build X.500 directories and would be wise to do so even if they do not plan to support the standard in the near future, users and vendors said recently.

By laying the groundwork for an X.500 directory now, users can protect themselves against having to drastically alter their network later. Moreover, the transition from a proprietary directory service to an X.500-based system will be much easier.

X.500 is a standard for creating one or more data bases that form a single logical directory of a myriad of people, devices and applications on a network, and for communicating between such directories.

Much of the work needed to build an X.500 directory involves examination of the X.500 specifications and organizational planning, neither of which necessitates that a user have an X.500 product in-house (see graphic).

Teamwork

Dick Andersen, distributed network applications marketing manager at Digital Equipment Corp., said the first step to building an X.500 directory — and one that is often overlooked — is to form a team to develop an administrative plan.

The team should include an administrator who will ultimately be responsible for day-to-day maintenance of the directory, a network manager and users of the applications who will need access to the directory. A personnel department representative should also be included to help moderate and assign responsibilities, Andersen said.

The team should identify the tasks that need to be accomplished, assign responsibilities and deadlines to each member, and list the required resources.

Next, users should establish naming conventions, which define how various objects — including people, applications and network devices — will be described, Andersen said.

The naming convention is related to the X.500 Directory Information Tree (DIT), which defines a hierarchical directory structure.

For naming people, the DIT fits well with X.400 naming conventions, which also follow a strict hierarchy based on country, organization, organizational unit and personal name. DEC and other vendors recommend that users adhere to the X.400 naming structures when building any directory, even a proprietary one.

"If you don't, at some point you'll have to undo some of the work you've already done, unless you just happen to be really lucky," Andersen said.

Even when following X.400 naming structures to build a directory, users are afforded a great deal of flexibility in order to meet their own requirements, according to Anita Owen, product planner for IBM Canada. For example, when describing a person, users can choose to include not only the person's electronic mail address, but also a mailing address, telephone number, facsimile number and a host of other information. "There are something on the order of 50 or 60 fields to describe an organizational person," Owen said.

There are fewer guidelines when it comes to describing com-

(continued on page 14)

User mulls options due to problem with IBM bridges

By Tom Smith
New Products Editor

HARTFORD, Conn. — The overhead needed for IBM's source routing local-area network bridge protocol can sap bandwidth on large wide-area networks and lead to performance problems, according to an insurance company here.

Travelers Insurance Co., which is in the process of interconnecting hundreds of token-ring LANs, said it is exploring alternatives to IBM's implementation of source routing because of the problem.

Source routing, a protocol used to link token-ring LANs via bridges, generates "explorer" messages when one LAN needs to establish a session with another LAN. The message, which can be 2- to 18-bytes long, includes information such as bridge and ring identification numbers, according to Jeff Mayberry, development engineer in LAN interconnect development at IBM.

According to Robin Layland, engineering consultant in network engineering and telecommunications for Travelers, these messages can lead to problems when users connect multiple token rings in certain types of mesh networks, including those supporting IBM's Systems Network Architecture, because explorer messages get replicated.

In a mesh network of four bridges, for example, the first bridge will send an explorer packet to the other three, each of which will relay it to the next bridge, even though those bridges have already received it, Layland said.

Travelers currently has more than 50 token rings linked via IBM source routing bridges. Each bridge is linked to at least four others. The company plans to expand the network to support all of its 200-plus token rings.

"To handle the problem with the IBM solution, we have to throw more bandwidth at it" because of the amount of bandwidth absorbed by source routing messages, Layland said. "We're starting out with 56K bit/sec lines and having to go to fractional T-1s."

Although bridges can receive multiple copies of explorer packets, the associated overhead can be minimized by configuring the network based on parameters such as transaction rates, available bandwidth, applications and planned growth, IBM's Mayberry said.

For example, users can configure their bridges to stop forwarding frames once they have traversed more than three hops on the network, Mayberry said. Such steps will minimize the impact of multiple messages and optimize network throughput.

In exploring alternatives to IBM's implementation of source routing, Travelers discovered that cisco Systems, Inc.'s implementation of the protocol on its routers actually reduces overhead.

Overhead is decreased on a router because only the nodes that are actually going to receive data get the source routing information, cisco Systems explained. Routers constantly update information on network routes so they do not have to send out messages at the start of each session to determine the best route.

Cisco Systems' routers encapsulate SNA data in Transmission Control Protocol/Internet Protocol format, rather than leaving the data in native SNA format.

The performance improvement resulting from decreased overhead will be between 15% and 35%, with the figure rising as the number of potential paths within the mesh network increases, according to cisco Systems.

"With cisco, you're not chewing up bandwidth by having a storm of messages," which could allow more LANs to be added without increasing bandwidth, Layland said.

But there are drawbacks to cisco Systems' source routing implementation.

Mayberry said the process of encapsulating SNA data in TCP/IP will introduce overhead of its own. "I would expect that putting a frame into an IP packet and worrying about routing it might induce some latency," he said.

Cisco Systems acknowledged that its technique requires additional data that is not necessary in IBM source routing, typically another 40 bytes per SNA frame. But that overhead requires less bandwidth because the data isn't reaching multiple sites on the network.

Layland said the cisco overhead would not be seen as a drawback in Travelers' evaluation of the product. Although Travelers has not yet decided if it will go with the cisco Systems products, Layland said, IBM's implementation of source routing is unworkable.

"That's the reason we're looking at cisco and other vendors," he said.

Firm's devices to support data

continued from page 13

A key function of the device will be its ability to commandeer both 64K bit/sec B channels on a BRI circuit to transmit data between a host and remote devices, according to Robert Ryan, Ascend's president and chief executive officer. Most terminal adapters today only allow users to transmit data over one B channel, while the other is reserved for voice traffic.

The product will run packet assembler/disassembler software that supports the transmission of as many as 32 simultaneous X.25 sessions over an ISDN B channel.

The access device will initially include PAD software that converts asynchronous data to X.25 packets. Later releases will include PAD software that converts other protocols such as IBM's Systems Network Architecture to X.25.

The access device will also support different rate adaption protocols implemented on remote terminal adapters. Rate adaption protocols such as AT&T's Digital Multiplexed Interface and CCITT V.120 enable users to transmit data over B channels at rates under 64K bit/sec.

Lastly, the access device supports network management capabilities not currently supported by ISDN terminal adapters. Ryan said users can monitor, configure and diagnose the access device from a local or remote asynchronous terminal.

In addition, the company is working on a microcomputer-based gateway that will pass management data from the access device to a Simple Network Management Protocol-based integrated network management system. Eventually, the company will develop a gateway to pass that data to management systems such as IBM's NetView.

Ryan said the data center access device will be less expensive to use than stacking terminal adapters in front of hosts. For instance, he said that based on an average cost of $1,000 each, 100 terminal adapters would cost $100,000 to install in a data center to support 100 remote sites. Ryan said his company's access device will support 100 remote sites for about $30,000.

Bandwidth manager

The forthcoming ISDN bandwidth manager will break down high-speed data streams from LAN bridges and videoconferencing units into 64K bit/sec increments. The product will then transmit the data over an appropriate number of BRI circuits or B channels within a PRI line to another ISDN bandwidth manager at a remote site.

The remote bandwidth manager takes data off the individual B channels and runs synchronization and phase ordering software to reassemble it and hand it off to a LAN bridge or videoconferencing unit. The bandwidth manager attaches to a videoconferencing unit or LAN bridge via a V.35 or RS-449 interface.

Leased-line modem use declining

Modem operating speed (bit/sec)	Units installed in: 1989	1994
Under 2,400	35,968	965
2,400	37,379	9,654
4.8K	108,610	7,240
9.6K	385,780	185,839
14.4K	21,863	54,545
19.2K and above	115,663	224,455

Users trading in low-speed leased-line modems for higher speed units will slow the pace of migration to digital data services.

GRAPHIC BY SUSAN SLATER SOURCE: FROST & SULLIVAN, INC., NEW YORK

Modems may stave off exodus

continued from page 13

In fact, Codex Corp. recently announced a modem that it claims can obtain a top speed of 24K bit/sec ("Codex wares aimed at digital net needs," *NW,* May 21).

Another factor that could help the modem's continued success is the fact that, even though digital circuits support higher transmission speeds, data terminal equipment with RS-232 interfaces is still limited to RS-232's maximum speed of 19.2K bit/sec, Held said.

"A [data service unit/channel service unit] will be less expensive than a high-speed leased-line modem, but your [data terminal] equipment won't work at the higher bit rate supported by the DSU/CSU," Held said.

This means users with a digital circuit and a DSU/CSU supporting 64K bit/sec will have to buy additional multiplexing equipment in order to use the entire bandwidth, thus eliminating any cost advantages digital service has over analog.

Prepping for X.500 saves

continued from page 13

puter systems or applications because many of their attributes have yet to be defined by the International Standards Organization, she said.

Don't give away the farm

Another topic to consider is security, which involves not only deciding who can access the various features provided by the directory, but also how much information should be included in various directory entries, Andersen said. Users have to keep in mind that X.500 is intended to be accessed not only by users within a company, but by users outside as well.

Mark Payne, worldwide EDI deployment manager for Texas Instruments, Inc. in Plano, Texas, said his company currently has a committee discussing security and other issues as TI prepares to develop a directory for its worldwide X.400 net ("TI embraces X.400 as medium for EDI," *NW,* Nov. 27, 1989).

"We don't want to give away the farm by telling everybody all of our data base names and structures," Payne said. Among the issues to be decided are how to restrict access to sensitive directory data to only properly authorized TI and non-TI users, or whether to include such data at all.

Users also have to decide how the X.500 directory will be physically arranged. Some may opt for a single centralized directory data base, known as a Directory System Agent (DSA), which is a tack Unisys Corp. recommends as a starting point.

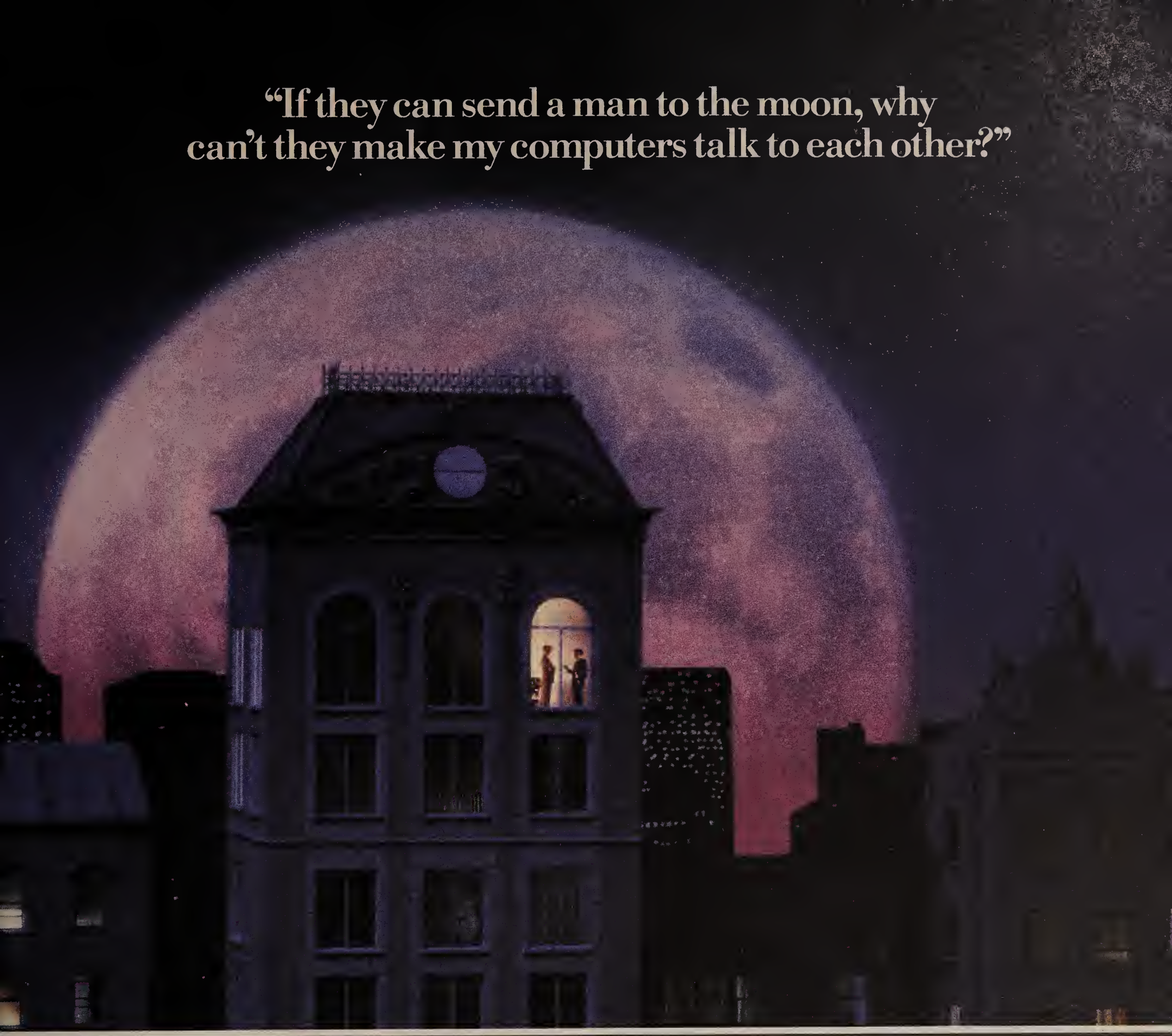
As the directory grows, users will likely want to use multiple DSAs distributed throughout the net and will have to decide the optimum location for each. Those locations will not necessarily follow the same structure as the DIT because the DIT describes an overall directory structure, not the structure of each DSA.

For communications between DSAs, the X.500 standard defines the Directory System Protocol (DSP), according to Roy Rosner, president and chief executive officer of GSI Danet, Inc. in Reston, Va., a vendor of Open Systems Interconnection software and test suites. Likewise, the Directory Access Protocol (DAP) is used for communicating between a DSA and a Directory User Agent, which is the user or application interface to the directory.

"Anybody who's putting a system together who expects to use a directory service can just as easily implement the X.500 DAP and DSP as any other procedure for accessing directory information," Rosner said.

If users building a proprietary directory today do not use DAP and DSP, they should at least use some other formal protocols, he said. "If there's a formal specific protocol, it's always going to be easier to pick it up and either modify it or replace it."

For $23, users can obtain a copy of the X.500 standard by writing to Omnicom, Inc., 115 Part St., SE, Vienna, Va. 22180, or by calling (703) 281-1135.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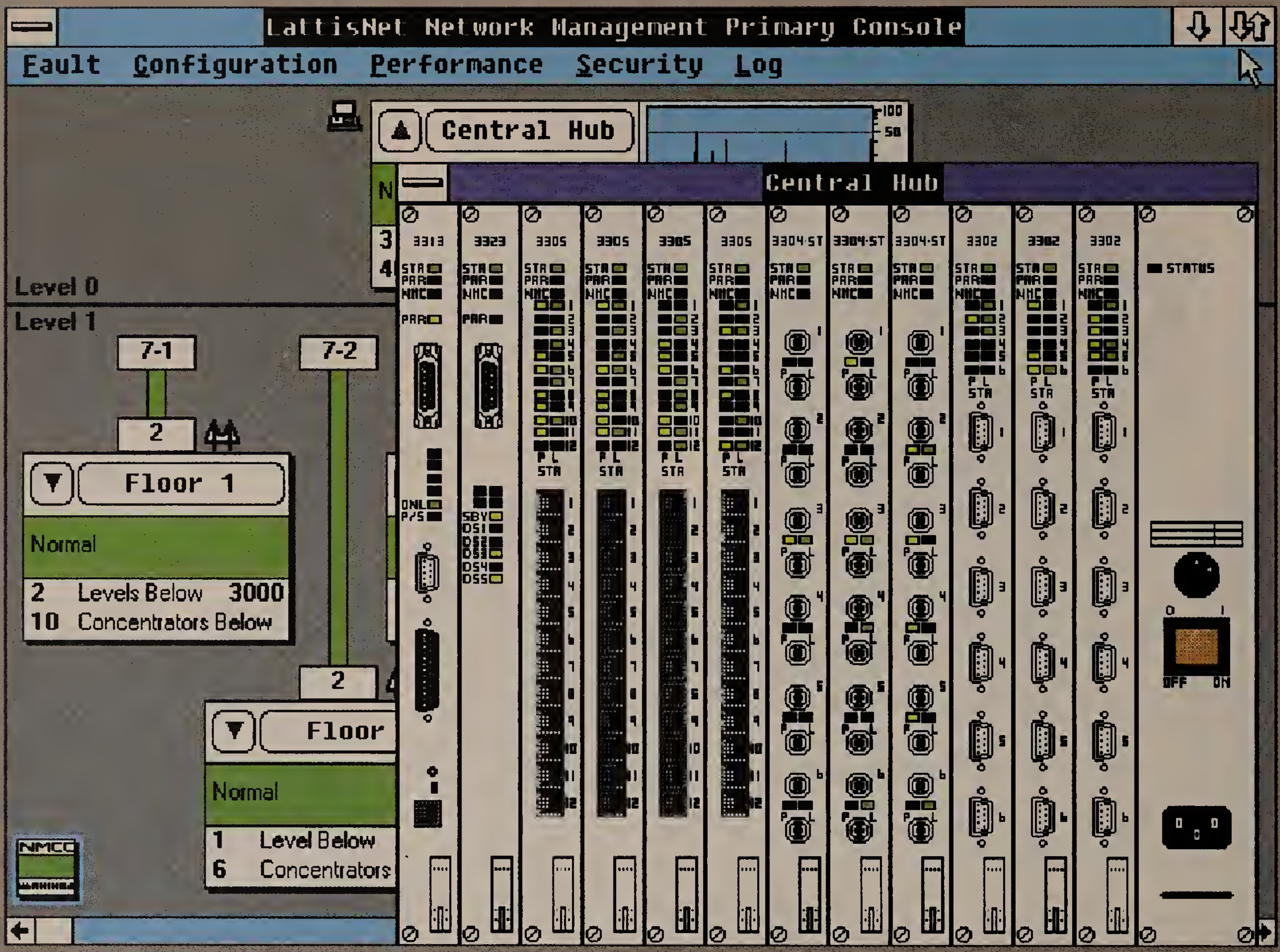

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LOCAL NETWORKING

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Worth Noting

"From 1986 through April 1989, IBM sold one million token-ring adapters. Since last April, we've sold 1.2 million token-ring adapters, and over 50% of them were dual-speed 16M/4M bit/sec boards. And we have a six-week order backlog."

John McElroy
Director of local-area networks
Communications Business Unit
IBM
Research Triangle Park, N.C.

LAN bridge employs both primary and backup links

Retix software improves efficiency of internets.

By Susan Breidenbach
West Coast Bureau Chief

SANTA MONICA, Calif. — Retix recently announced software that enhances its 4820 and 4880 remote local-area network bridges by enabling them to split the data they are routing between primary and backup paths in a complex internetwork.

The adaptive routing software is built on top of the 802.1 Spanning Tree Protocol, which enables a self-learning bridge to select the optimal path between two points and keep the remaining paths in standby mode. The backup paths are not used unless the primary link goes down.

The new Retix adaptive routing software makes better use of an internetwork by enabling the bridge to use all available paths simultaneously, including the backup paths.

"With this software release, our customers can construct cost-effective networks that make more efficient use of backup links to every location in the network," said Randy Fardal, director of marketing for Retix's internetworking products unit. "The data can now be transmitted across all available links in the network, not just those active under Spanning Tree."

In automatic mode, Retix bridges with the new software will send as much data across the primary path as its bandwidth can accommodate on a first-come, first-served basis. When that link is filled to capacity, it will then start sending data

(continued on page 19)

PHOTO JOHN THOMPSON ©1990

John Rose, DEC's group manager of personal computing systems

DEC exec shares PC plans for the '90s

John Rose talks about the firm's networking strategy and the healthy Apple/DEC relationship.

John Rose, manager of personal computing systems at Digital Equipment Corp., oversees DEC's worldwide personal computer and personal computer networking business. *Network World* Senior Editor Laura DiDio recently spoke with Rose about DEC's personal computer networking strategy for the 1990s.

Would you outline DEC's networking strategy and how it will change as we head into the 1990s?

We've been in the PC networking business since October 1986. Our approach for the past four years has been to make the PC a full peer on the network with any computing resource and to bring network services such as security, authentication, file and print services, and electronic mail messaging to networked PC users in a transparent fashion.

It's also been to deliver [Network Application Support] network and application services to the intelligent desktop based on industry and IEEE standards. These include software services such as X.400, compound document, X Window capability, data base, videotex, notes and conferencing.

Why did DEC decide to integrate Apple Computer, Inc.'s Macintoshes into DECnet?

We started off initially with DOS integration, and there were a couple of approaches we took: We made DOS PCs full peers on DECnet networks. Since we are committed to OSI wide-area networking in DECnet Phase V, in 1986, we integrated the MS-Net operating system and the NETBIOS protocols with DECnet on the seven-layer OSI model. We utilized VAXes as either dedicated or nondedicated network servers to the DOS PCs and continued to enhance that with more features. With the advent of Microsoft Corp.'s LAN Manager, we were able to easily integrate LAN Manager on the same model.

In 1987, we recognized that we would carry the same strategy forward for OS/2 and Macintosh client workstations because 15% to 20% of personal computers in DEC sites are Macintoshes. Macintosh users have an affinity for VAXes, but typically, the access has been via terminal emulation.

From our work with our leading-edge end users, we saw that there was a need for a more seamless interoperable environment: direct connections between VAXes and Macintoshes that didn't involve exiting the application and running terminal-emulation programs, and at the same time let users retain their familiar user interfaces.

We wanted seamless access to file, print and application services to the VAX without changing the Macintosh graphical user interface, and that's how we got together with Apple in 1988.

Were the rumors of problems between Apple and DEC true?

Not true at all. I've been very impressed with the synergism between the engineering development groups at Apple and DEC. We'll deliver the full DEC LanWorks for Macintosh product suite in September as promised, and we're already beginning to spec out and discuss areas of enhanced capabilities between

(continued on page 19)

Netnotes

Gateway Communications, Inc. recently introduced a 10BaseT-compliant Ethernet adapter for IBM Personal System/2s based on the Micro Channel Architecture (MCA) bus.

The G/EtherTwist MC adapter is fully compatible with the IEEE 802.3 10BaseT draft standard for transmitting data at 10M bit/sec over unshielded twisted-pair wiring. Workstations that use the G/EtherTwist MC can be located up to 330 feet from the wiring hub.

The interface has a 16-bit MCA interface and 64K bytes of extended on-board memory, which enhances performance of I/O-intensive applications such as computer-aided design and manufacturing.

The adapter has operating system drivers for Novell, Inc.'s NetWare Version 2.1X, NetWare 386 and OS/2 Requestor for NetWare, as well as drivers for Microsoft Corp.'s OS/2 LAN Manager and Banyan Systems, Inc.'s VINES.

G/EtherTwist MC is available now and is priced at $460.

For more information, contact Gateway Communications at 2941 Alton Ave., Irvine, Calif. 92724, or call (714) 553-1555.

Gateway can be shared by Macintosh, DOS systems

By Susan Breidenbach
West Coast Bureau Chief

SANTA CLARA, Calif. — Macintosh-to-mainframe specialist Tri-Data Systems, Inc. recently enhanced its Netway 2000 Systems Network Architecture gateway with support for DOS-based personal computers, enabling Macintosh and DOS systems on a LAN to share a single gateway.

The enhancement is in two parts: 3270 terminal-emulation software that runs under Microsoft Corp.'s new Microsoft Windows 3.0 and support of the native Internetwork Packet Exchange (IPX) protocol in Novell, Inc.'s NetWare. Together, they enable personal computer users on Ethernet or token-ring local-area networks running NetWare to establish mainframe sessions via the Microsoft Windows graphical user interface.

Tri-Data also introduced Netway 2000 gateways at both the high and low ends of the line.

"Our goal is to provide a consistent user interface for both IBM PC and Macintosh desktop computers for IBM host connectivity," said Bob Johnson, president and chief executive officer of Tri-Data. Providing a common gateway for both types of computers helps corporate LAN architects save costs, he added.

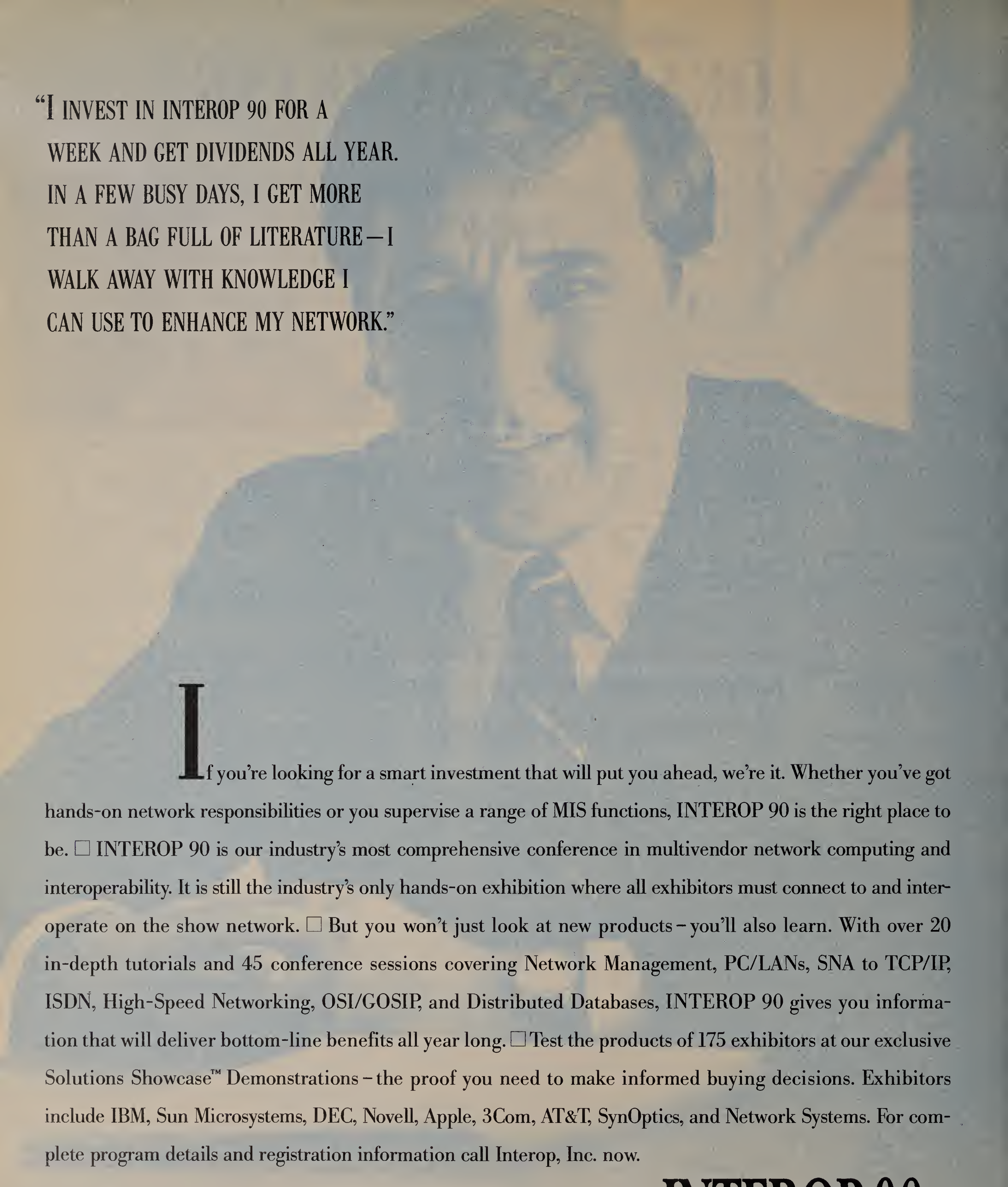
The new Windows 3270 software lets each personal computer on the network support as many as eight concurrent mainframe sessions, each in its own window. DOS applications running under Microsoft Windows can be displayed on the screen along with the 3270 sessions, and data can be cut and pasted between them.

Windows 3270 offers "virtual light pen" support, which lets a mouse be used in point-and-click operations in applications originally developed for 3278 light pens. Other features include keyboard macros and a screen-capture capability that lets users record host screens to local disks for later manipulation by other applications.

The Netway 2000 supports as many as 64 concurrent host sessions. Tri-Data has added to the line with the 16-session NetWay 2016, the 32-session Netway 2032 and the 128-session Netway 2128. Like the original model, all of the gateways are based on a Scalable Processor Architecture (SPARC) Reduced Instruction Set Computer processor and the 32-bit VMEbus.

Pricing ranges from $5,995 for a 2016 configured with only Macintosh support to $19,995 for a 2128 that includes the IPX and Windows 3270 software. Tri-Data also lowered the prices of its Ethernet and 16M/4M bit/sec token-ring VMEbus adapters from $2,795 to $1,995 each.

For more information, contact Tri-Data at 3270 Scott Blvd., Santa Clara, Calif. 95054, or call (408) 727-3270.



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DEC exec shares PC plans for the '90s

continued from page 17

VAXes and Macintoshes.

The products are 100% functional now, and we've done our final beta update. The product has been thoroughly exercised on small and large networks, and there are no more gremlins. We're now entering the quiet period of 30 days during which we give users a final chance to report any complaints or problems with the software before we actually start manufacturing.

Some users have complained about the pricing structure of DEC LanWorks for Macintosh. They claim it is expensive because it is based on clients rather than server licenses. What's your reaction?

Even if users only utilize a couple of the services in DEC LanWorks for Macintosh, we believe it's a bargain at $295 per workstation client. We have had some feedback that some of our very large customers would prefer a site licensing approach rather than the current per-client charges, and we are certainly considering that.

But overall, users are getting excellent value for the $295 price, and if the user already has a DECnet license, they get the server software free. I think there's a lot of discussion going on in the industry among vendors regarding server licensing vs. client licensing. There's more of a realization that vendors have a lot of value to provide at the client level, and you'll see more value coming.

The DEC/Apple alliance has taken nearly three years to get a product to market. Do you see DEC entering similar alliances with other vendors that would demand the same level of involvement?

Certainly. We have a number of relationships with networking vendors today, and those relationships vary in size and scope. We work very closely with Compaq [Computer Corp.] to integrate Compaq PCs into DECnet local- and wide-area networks. We also work with Toshiba [Ltd.], [Ing. C.] Olivetti [and Co., S.p.A.] and Zenith Data Systems [Inc.] testing their new PC products to ensure that these hardware platforms work in the DECnet environment.

Is there any partner on the horizon on the level of Apple?

We're working with many application developers. We have a comprehensive relationship with Microsoft [Corp.] in both operating system and networking applications. We're currently the largest volume reseller of LAN Manager.

How many copies of LAN Manager has DEC sold to date? And do you think that OS/2 and LAN Manager are successful?

DEC currently has several hundred LAN Manager customers, representing a total of 300,000 nodes. I think that LAN Manager will be successful. The experience DEC has had with it and the incorporation of LAN Manager on DECnet networks has been very positive. Like Windows 3.0, LAN Manager will be continually enhanced by Microsoft, and it will be a viable mainstream network operating system. OS/2 is also gaining acceptance as more applications become available, and these applications will drive the demand [for OS/2 and LAN Manager].

What about Novell, Inc.'s NetWare? Currently, DEC only has a service and support agreement with Novell. Do you plan to support NetWare in the DEC environment the way that you support LAN Manager?

NetWare is a great product, and Novell has been a leader in the LAN market. NetWare will continue to be successful.

I think we'll see LAN Manager and NetWare coexist; there will be no losers between them.

We've certainly been talking to NetWare users who would like DEC to provide integration capabilities for their NetWare-based LANs and DECnet LANs. They're telling us they want some or all of the NAS applications brought directly to their

(continued on page 52)

LAN bridge employs primary and backup

continued from page 17

across the secondary links. However, users can also elect to prioritize certain types of data so that particularly important items always go over the primary path while relatively insignificant ones never do. But the main point, Fardal said, is that with all of the links in use, data traffic is better balanced throughout the internetwork, resulting in greater overall throughput.

Also, the adaptive routing capability lets users build complex networks with fewer bridges because it does not require a separate pair of bridges between each point-to-point link. Rather, a bridge at one site can be linked to two remote sites.

Pricing for Retix's Series 4800 bridges, including the adaptive routing enhancement, start at $4,950. Upgrade kits for existing users cost $500 per bridge.

Retix also announced software for its 5010 Network Management Center, which is based on a personal computer and provides a color graphics display of the network topology.

The new software enhances the management station's graphics capability and boosts its ability to store statistics so that it can support the new adaptive routing feature of Retix's remote LAN bridges. It is available as an upgrade to existing users of the 5010 for $100.

Retix can be reached at 2644 30th St., Santa Monica, Calif. 90405, or call (213) 399-2200. ◼

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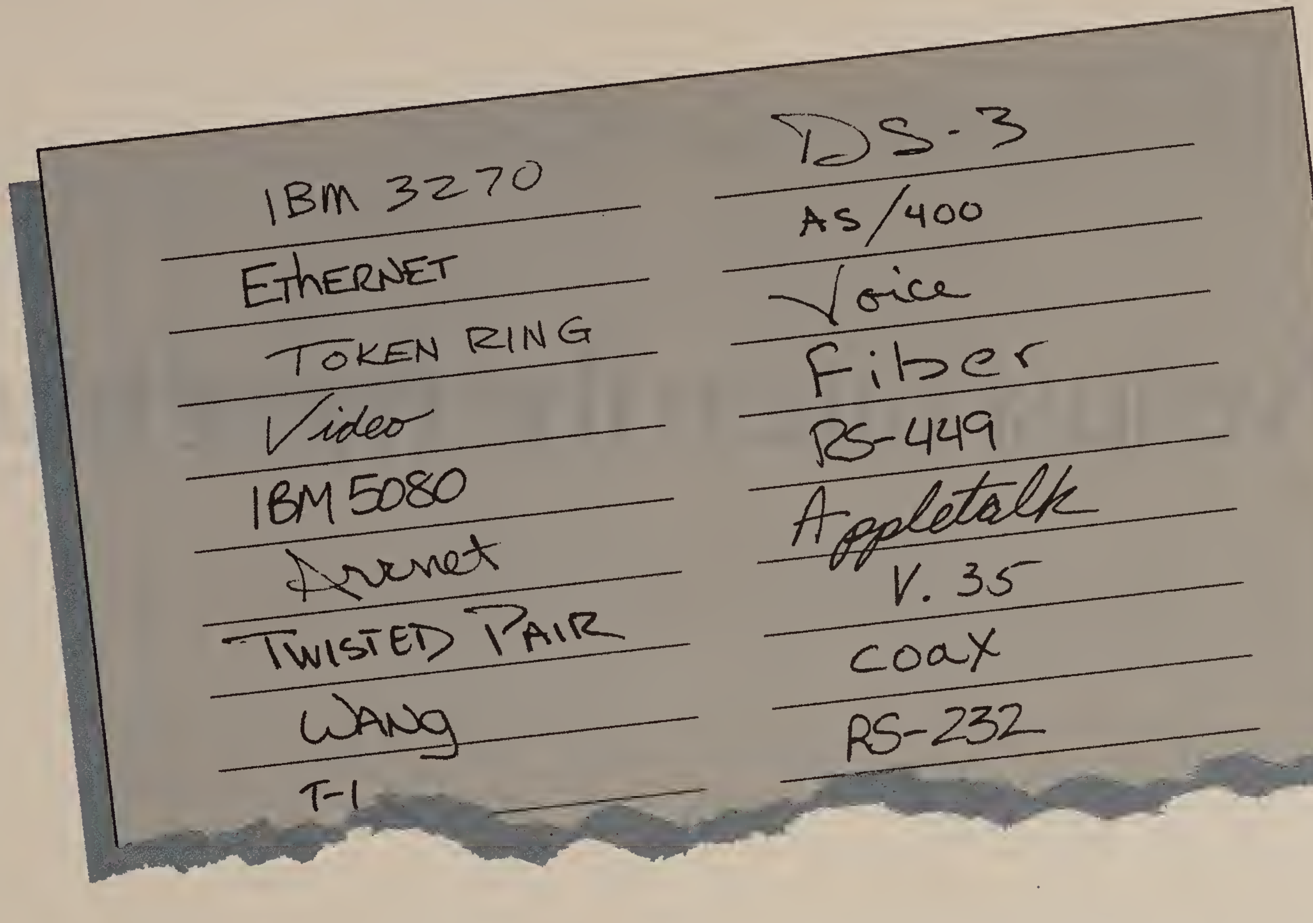

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See The FAXNet Form on Page #30

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See The FAXNet Form on Page #30

MANAGEMENT STRATEGIES

MANAGING PEOPLE AND TECHNOLOGY: USERS GROUPS AND ASSOCIATIONS

Worth Noting

> "If network managers run their departments in a more businesslike fashion and get closer to users, then they don't have to fear that an outsourcing vendor might come and take their job away."
>
> **Ken McGee**
> Project manager
> Gartner Group, Inc.
> Stamford, Conn.

Association Watch

The **Communications Managers Association (CMA)** recently elected a president and welcomed a member to its 10-person board of directors.

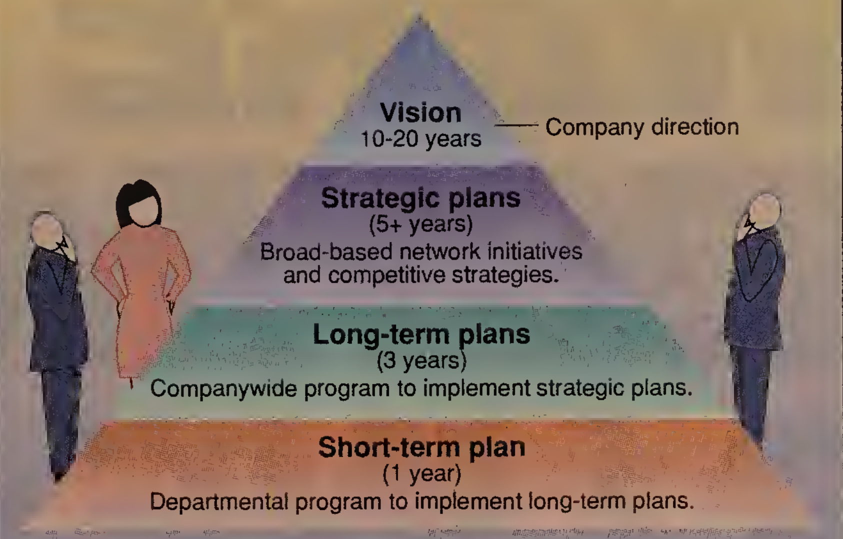
Ron Kopitowsky, director of telecommunications at the New York Metropolitan Transportation Authority, was elected to serve as CMA president for a one-year term beginning July 1.

The new member of the board is **Kathleen Spola**, telecommunications manager at CPC International. She was elected to the position of director for a one-year term.

The **International Communications Association (ICA)** recently elected three members to its 11-person board of directors for the 1990-1991 term.

Larry Gessini, manager of telecommunications at Agway, Inc., will serve as vice-president of administration. He begins a four-year term on the board of directors' executive committee and will become president in 1993, subject to membership approval. **Bob Harrold**, manager of electronic data interchange services at AgriData Resources, Inc., will serve as director of ICA's member services. **Jim Weiss**, director of telecommunications business planning and development at System One Corp., will serve as director of academic development.

Planning pyramid


Vision
10-20 years
Company direction
Strategic plans
(5+ years)
Broad-based network initiatives and competitive strategies.
Long-term plans
(3 years)
Companywide program to implement strategic plans.
Short-term plan
(1 year)
Departmental program to implement long-term plans.

The planning pyramid provides network managers with a guide for setting and implementing network plans.

GRAPHIC BY SUSAN SLATER

SOURCE: RACAL-MILGO, SUNRISE, FLA.

Four simple steps toward an effective network plan

Pyramid approach makes long-term planning easy.

Edmund Daly
Special to Network World

Network planning in a fast changing business environment is never easy. The best laid strategic plans can quickly become obsolete due to rapid changes in technology and customer needs.

The task of creating a comprehensive network plan can be simplified by using a pyramid planning structure with four levels: vision, strategy, long-range plans and short-range plans.

The vision portion looks out 10 to 20 years into the future, establishing where a company is and where it wants to go. This is usually established by senior management. Without a clear vision of the future, a company can become a slave to external forces — many of which are determined by competitors.

Many companies fail to define a clear vision of where they will be in 20 years because they mistakenly think the future will be much like the past. They believe the factors that made them successful yesterday will guarantee success tomorrow. These companies are driven by culture, not vision, and are led by managers rather than leaders.

A company's vision sets broad goals that must be achieved to build a sustained competitive advantage.

The second level of pyramid planning — strategic planning — defines a series of initiatives and priorities designed to help a company achieve the vision. Strategic planning takes into account the company's strengths, weaknesses and competition while defining a path toward the vision.

Daly is senior vice-president of engineering for Racal-Milgo in Sunrise, Fla.

For example, a major bank might decide its vision is to become a worldwide supplier of financial services. Its strategy to achieve that goal is to establish a global information processing network in the next five years.

Good strategic planning is a result of insight, not data analysis. It can't be learned from business school; rather, it's a creative capability that is tempered by experience and insight into the company and its business.

Network strategies are driven by both technology and customers, and they typically span many years. In order to draft a network strategy, managers must understand customer needs and internal capabilities, as well as the competition.

> A company's vision sets broad goals that must be achieved to build a sustained competitive advantage.
>
> ▲▲▲

But the difficulty of strategic planning is that customer needs and technology change. Thus, it's imperative that companies not remain locked into any one strategy. Companies must be flexible enough to adapt their strategies to changes in the business environment.

For example, network managers need to establish network architectures that can accommo-

(continued on page 26)

Unwilling partners handicap EDI users

Firms using EDI lose out on benefits because they can't persuade some partners to participate.

By Tom Smith
New Products Editor

Users say they are having trouble realizing some of the promised benefits of EDI because of problems they face in persuading business partners to adopt the technology.

Major electronic data interchange users say business partners — particularly smaller companies — often balk at implementing EDI because of its cost, the perceived complexity of the technology and the sometimes painful organizational changes required to make EDI work.

Because of the difficulty of getting partners to adopt EDI en masse, some users are not reaping the full economic and productivity benefits they envisioned from EDI.

Union Pacific Technologies is one EDI user that knows how difficult it can be to persuade business partners to adopt EDI. While the company's goal is to receive bills of lading electronically from all trading partners, the reality is that many suppliers continue to submit them by facsimile.

In April, the company received 48% of its bills of lading via fax, while 41% came in via EDI and 11% were received by telephone. Union Pacific Technologies, a subsidiary of Union Pacific Corp., is a longtime user of EDI.

The price of technology

According to Rex Cobb, director of imaging systems for the St. Louis-based company, cost has been a major barrier to acceptance of EDI among Union Pacific's trading partners. Many companies think that the volume of transactions they generate does not justify the cost of implementing EDI, even though in most cases they would only need to buy a personal computer, Cobb said. As a way to encourage adoption of EDI, Union Pacific supplies its trading partners with both training and software.

If a significant proportion of trading partners do not adopt the technology, EDI users are then forced to accommodate a variety of communications methods. Union Pacific, for example, has implemented an imaging application to automate the process of receiving and handling faxes (see "Fax servers let Union Pacific reduce paper," page 26).

It is difficult to dislodge fax machines as a means of communicating because they are so prevalent, Cobb said. "To open a business, there are two things you need: a telephone and a fax," Cobb said. "I don't care what kind of an outfit we deal with, you always find a fax machine."

R.J. Reynolds Tobacco Co. also has had problems getting smaller trading partners to embrace EDI, according to Jim Pitts, manager of planning in the company's purchasing department in Winston-Salem, N.C.

About 75% of the company's annual 150,000 to 200,000 transactions are made via EDI, while the remaining 25%, primarily from smaller trading partners, are made via other forms, Pitts said.

> Cost concerns aside, EDI technology can be intimidating to a small business.
>
> ▲▲▲

Pitts explained that a small supplier might only sell R.J. Reynolds $10,000 worth of goods in a single year, with a profit of about $2,000.

"How can they justify $5,000 for a personal computer, $2,000 for software [and paying the charge for] dialing into a network every so often, especially if there's a possibility of not having that contract next year?" Pitts asked.

The minimum investment required is closer to $25,000, a figure that includes hardware, software and communications costs for a small business that wants to make "a very small intrusion into the EDI world," according to Jerry Dreyer, president and chief executive officer of the Electronic Data Interchange Association (EDIA) in Alexandria, Va.

Intimidating technology

Cost concerns aside, EDI technology can be intimidating to a small business, particularly one that currently does not have any form of automation.

"Fear is a factor," Pitts said. "We are asking them to do something that they are not knowl-

(continued on page 26)

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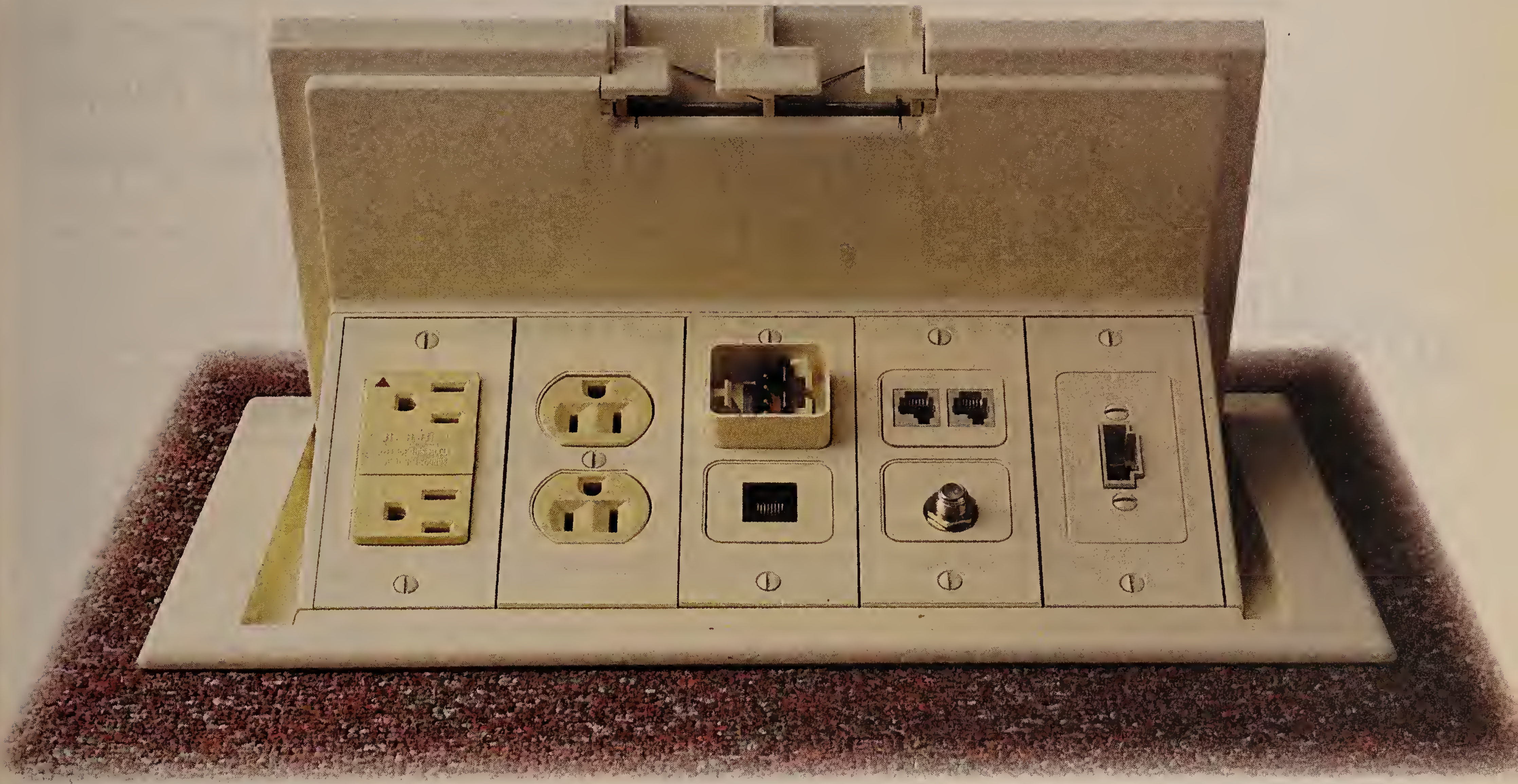

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Four simple steps to an effective net plan

continued from page 23

date new technologies without a major network restructuring.

Networks that are frozen by overreliance on today's technologies cannot provide companies with a long-term competitive advantage.

Strategic plans drive long- and short-range plans, which are tactical in nature.

Long-range plans are similar to business plans. They are companywide in scope and usually cover a three-year span. Projecting costs and revenues, they describe potential obstacles and competition. Long-range plans also establish marketing plans and outline responsibilities for each group within the company.

The purpose of these plans is to give concrete shape to the business strategy. Typically, companies use long-term plans to build network and information system infrastructures that will support new customer services designed to give the company a strategic advantage.

But managers must be careful not to spread precious resources over too many areas or expect unrealistic achievements. They must balance a healthy optimism with a careful analysis of the company's strengths and weaknesses.

For each long-term plan, there is a set of short-term plans.

Short-term goals are task-oriented and answer the question: "What am I going to do next week?" These plans orchestrate the company for one fiscal year and are closely tied to the yearly budget, available resources and work objectives.

Whereas long-term plans usually cut across organizational boundaries, short-term plans are drawn up for each functional area within an organization or business unit. Remember that network planning starts with business vision but must end with terminals and cables.

Overall, effective plans seek to define weekly tasks that will enable companies to achieve visionary goals. Companies that meet these goals can adapt their plans to changes in the business environment and successfully balance the needs of the future against short-term profits. ☒

Unwilling partners handicap EDI users

continued from page 23

edgeable about."

The fundamental change in business procedures necessitated when moving to EDI, particularly from a paper environment, is another barrier to acceptance. "I think users see moving from the paper environment as a threat to their corporate culture," Dreyer said.

Another hurdle, faced by Union Pacific, is the fact that some larger trading partners with multiple sites have not implemented EDI on a uniform basis across their sites. "Each plant manager makes a decision whether to use EDI," Cobb said. ☒

Fax servers let Union Pacific reduce paper

ST. LOUIS — Faced with resistance to EDI from trading partners, Union Pacific Technologies has implemented facsimile servers on its imaging network to attain a goal associated with EDI: the elimination of paper.

The fax servers are helping Union Pacific deal with trading partners that transmit bills of lading via facsimile rather than using electronic data interchange.

In April, for example, the firm received more than 137,000 bills of lading at its customer service center here, according to Rex Cobb, director of imaging systems at Union Pacific. Of those, 48% were received via fax, 41% were received via EDI, and the remaining 11% were delivered by telephone.

The company, which already has an electronic imaging system in place, previously scanned fax documents into the imaging system for indexing and retrieval. But the scanning process was another time-consuming step in every transaction.

To streamline operations, Union Pacific has implemented FileNet Corp. Facsimile Servers, which are personal computers that house fax boards and are able to send documents directly into the imaging system for storage, indexing and retrieval.

Cobb said Union Pacific has reaped several benefits from using the product.

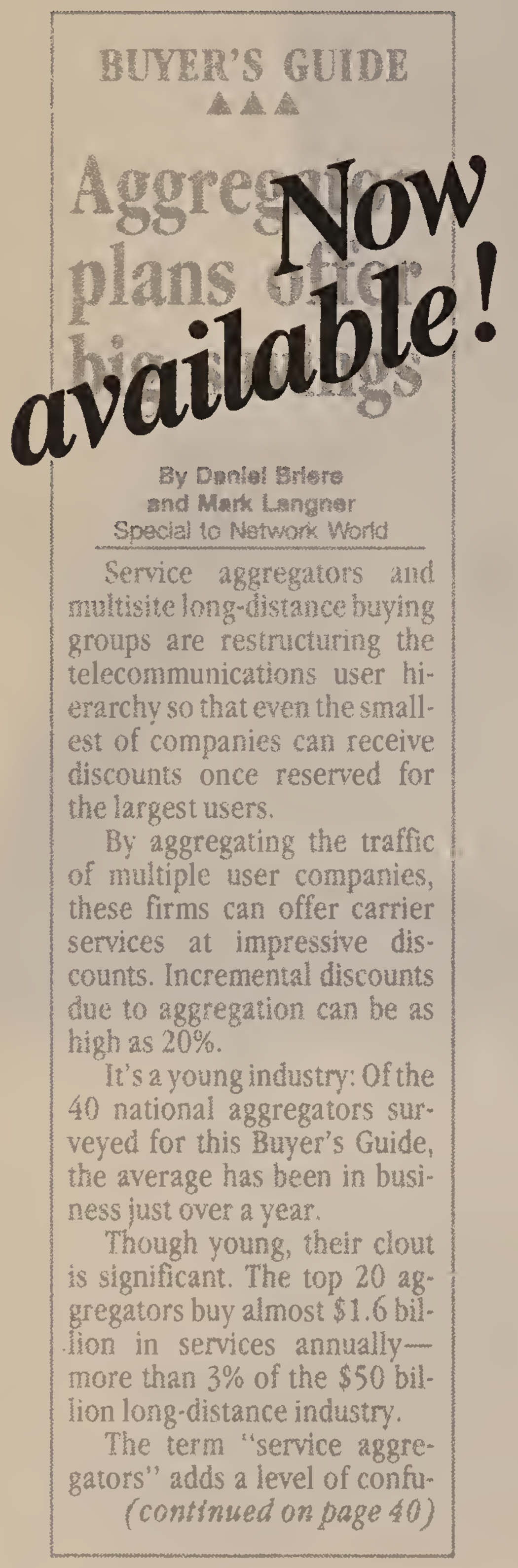
The system has halved the time required to route bills of lading to employees for processing — from two hours to one.

Also, managers are able to monitor lists of documents that have been received, as well as when they came in and which employees are working on them. This eliminates the need for manual distribution of faxes and provides better tracking.

Cobb said Union Pacific will realize cost savings and productivity improvements with the fax servers, but he declined to cite specific figures.

The company currently has two single-line fax servers available to customers in the western U.S. and will begin implementing additional fax servers in June to serve other regions, Cobb said.

— *Tom Smith*



BUYER'S GUIDE
▲▲▲

Aggregator plans offer big savings

By Daniel Briere
and Mark Langner
Special to Network World

Service aggregators and multisite long-distance buying groups are restructuring the telecommunications user hierarchy so that even the smallest of companies can receive discounts once reserved for the largest users.

By aggregating the traffic of multiple user companies, these firms can offer carrier services at impressive discounts. Incremental discounts due to aggregation can be as high as 20%.

It's a young industry: Of the 40 national aggregators surveyed for this Buyer's Guide, the average has been in business just over a year.

Though young, their clout is significant. The top 20 aggregators buy almost $1.6 billion in services annually— more than 3% of the $50 billion long-distance industry.

The term "service aggregators" adds a level of confu-

(continued on page 40)

Now available!

The *Network World*/ Telechoice Report on Service Aggregation

Service aggregation is one of the hottest telecommunications topics of the 1990s. *Network World's* April 16th Buyers Guide provided an introduction to service aggregators and multilocation buying plans, and now this 150-page report brings you a wealth of additional in-depth information that will bring you up to speed on all the important issues relating to service aggregation. The report is organized as follows:

General Information
- What is service aggregation?
- How does it work?
- Who is involved?
- What do the carriers think of service aggregation?

For Users:
- Are service aggregators legitimate?
- How much can I save?
- What are the pitfalls?
- How does using an aggregator change my relationship with my carrier?

For aggregators and would-be aggregators:
- How do I get involved?
- Is there a future in service aggregation?
- How can I survive in this highly competitive market?
- What are the available multisite discount plans offered by the long distance carriers?

The report also includes a detailed listing of service aggregators and the products they offer.

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INTERNATIONAL NETWORKS

USER STRATEGIES, INTERNATIONAL SERVICES & REGULATION

Worth Noting

The Mexican government plans to sell its national carrier to private investors this October, while the government of Puerto Rico expects to do the same with its carrier by year end. Governments in Australia, Czechoslovakia, Hungary, Malaysia and Singapore may follow suit in the near future, according to Salomon Brothers, Inc., a New York investment firm.

World News

Belgium's national carrier, **Regie des Telegraphes et Telephones** (RTT), last week reduced charges for digital, transatlantic leased circuits by 8%.

The half of a transatlantic 64K bit/sec circuit supplied by RTT now costs $4,857 per month, down from $5,285. Also, a 256K bit/sec half-circuit now costs $39,666 per month, compared to $43,166 earlier, and T-1 half-circuits were reduced from $44,914 per month to $41,285.

These tariffs apply to both satellite and fiber-optic circuits.

U.S. carriers levy separate charges in addition to those from RTT for their half of the international circuits.

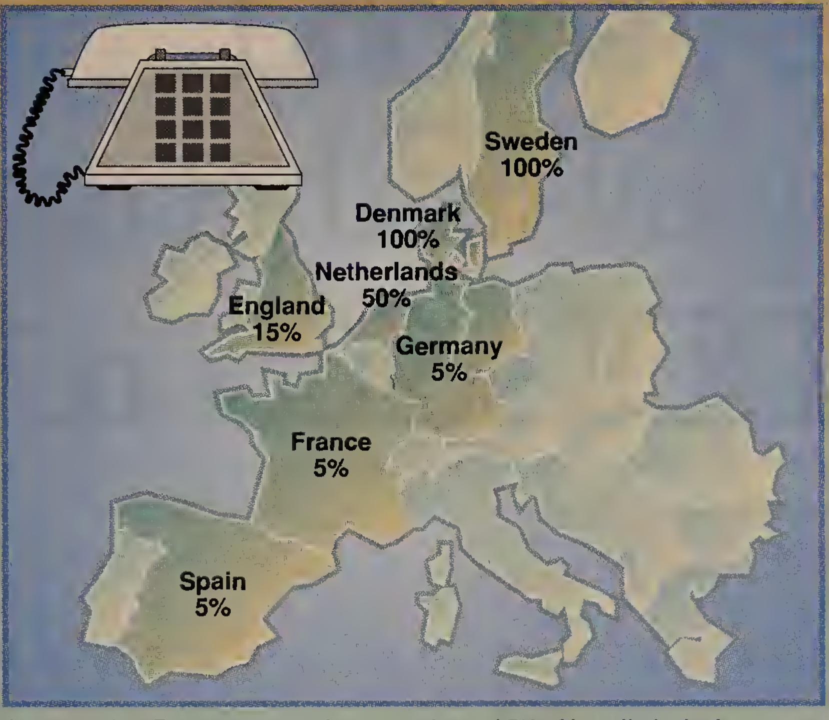
RTT also decreased prices by 8.2% to 20% for its half of intra-European private lines.

The carrier also implemented a new volume pricing plan that will give an 8% discount to users spending more than $21,428 per month on international private lines and 15% discounts to users spending more than $514,285 per month.

Starting in October, RTT will reduce the cost of a telephone call from Belgium to the U.S. from $1.71 per minute to $1.42 per minute.

Push-button phones in Europe

Percentage of telephones that support push-button service.



In most other European countries, an estimated 5% of installed telephones are push-button. Half of all telephones are expected to be push-button by 1992.

GRAPHIC BY SUSAN SLATER

SOURCE: PACIFIC BELL, SAN FRANCISCO

Brazil permits IVANs to market services to users

Competition should speed new network offerings.

By Walter Sweet
West Coast Correspondent

BRASILIA, Brazil — Government officials here are easing the country's rigid telecommunications restrictions by allowing international value-added network (IVAN) providers to market services to users.

The action is part of a sweeping trade reform announced last March, in which Brazilian authorities also dropped restrictions on the importation of computer and communications equipment from other countries.

While government officials consented to the resale of bandwidth from Empresa Brasileira de Telecomunicacoes S.A. (Embratel) — the nation's international carrier — to IVANs, it stopped short of privatizing its state-run carriers, according to a spokesman at the Brazilian embassy in Washington, D.C.

Until now, the government has forbidden the resale of bandwidth within the country and restricted network equipment purchases to products manufactured within Brazil.

"They're looking at some liberalization, and it looks like it's going to get better from a user's standpoint," said Robert Alex, president of RTA & Associates, Ltd., a Farmington Hills, Mich.-based consultancy. "Users are going to be able to do things quicker and with more sophisticated technology."

Alex said the presence of IVANs should improve services — for instance, reducing the wait for new business lines, which can take up to six months. He said Brazil's policy shift was based on the view that other countries have liberalized their telecommunications industries to increase foreign investments and gain a competitive edge.

According to Alex, users are already starting to see more leniency from telecommunications authorities.

For instance, Alex said telecommunications authorities are now much more willing to approve the purchase of modem equipment if the government does not already offer comparable gear. Before, he said, users were restricted to buying only equipment made in Brazil.

"Developing countries are going through a metamorphosis in telecommunications," Alex said. "They're finding out that unless they have the proper telecommunications facilities to lure in big businesses, they are going to lose a great deal of revenue."

Alex added that big businesses have been pressuring the government to add more services, such as satellite-based services, and improve the variety of data transmission offerings.

According to Neil Thompson, senior vice-president of international electronics services with MasterCard International, Inc., his company welcomes any sort

(continued on page 30)

Users to benefit from Argentina's net sale

New owners of Telco North and Telco South must comply with government-specified service levels.

By Barton Crockett
Senior Editor

BUENOS AIRES, Argentina — The privatization of Argentina's national telephone company will result in better network service in the country if the carrier's new owners comply with strict provisions put forth by the government here.

As one of the preconditions for selling a controlling 60% stake in the national carrier Empresa Nacional de Telecomunicaciones (ENTEL) to foreign investors, the government of Argentina is requiring that the new owners decrease the time it takes to install new circuits and repair lines while increasing the percentage of calls completed without difficulties.

In addition, after an initial steep price increase for switched services, the owners will be asked to reduce all tariffs an average of 2% per year from 1993 to 1997, and an average of 4% per year from 1998 to 2000. At least one of the companies participating in the deal, Bell Atlantic Corp., said it plans to go along with the cuts.

"We intend to run a system that will be of high standards and high quality," said Juan Carlos Valls, director of Latin American business development for Bell Atlantic International, Inc.

Bell Atlantic Corp. is a member of one of two consortiums that two weeks ago successfully bid for partial ownership of ENTEL. When the deal is completed in October, ENTEL will be split into two separate entities, Telco North and Telco South. A 60% interest in each is being sold off.

Bell Atlantic Corp. teamed up with a group led by Manufacturers Hanover Corp. to win 60% of Telco North, a new carrier that will serve the northern half of Argentina, including half of this city.

Another group, led by Citicorp and the Spanish carrier Telefonica de Espana, will buy 60% of Telco South, which will serve most of the rest of the nation. The remainder will be served by private phone companies.

Combined, the two consortiums are putting up $214 million in cash and writing off more than $6 billion in Argentine government debt and interest payments to acquire ENTEL. .

Bell Atlantic Corp. and Telefonica de Espana will be responsible for day-to-day operations of Telco North and Telco South, respectively. This control will last for at least seven years, with pos-

(continued on page 30)

Australia leans toward opening of public network

By Walter Sweet
West Coast Correspondent

CANBERRA, Australia — Australian ministers for the first time are seriously talking about proposing legislation that would privatize some or all of the country's telecommunications market as well as foster competition.

Lawmakers say the introduction of competition could lower service rates by as much as 30% and result in a new wave of innovative products and services.

Although the government still officially supports its state-run telecommunications agencies, two high-ranking officials — John Button, Australia's minister for industry, technology and commerce, and Kim Beazley, minister for transport and communications — have announced their support for breaking up the telecommunications oligopoly.

Australia's three government-owned and -controlled carriers — Australian Telecommunications Corp. (Telecom Australia), Australian Satellite Proprietary, Ltd. (Aussat) and Overseas Telecommunications Commission (OTC) Australia — supply domestic, satellite transport and international services, respectively, without competition. Competition is only permitted in the provision of value-added network services, such as public electronic mail services.

Button and Beazley said privatizing one or more of the three government-owned carriers would be essential for competition to flourish. The ministers' statements are the strongest indication to date that privatization of the country's carriers is being seriously considered.

(continued on page 30)

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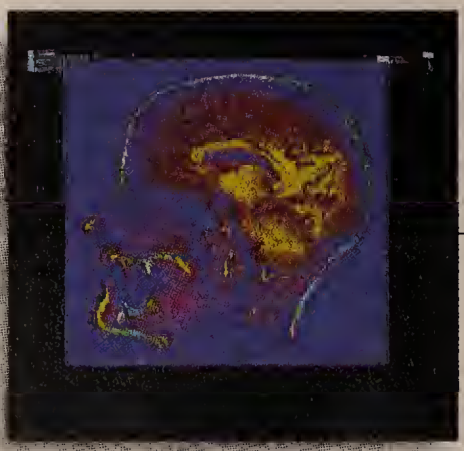

Ethernet 10 Mb/sec.

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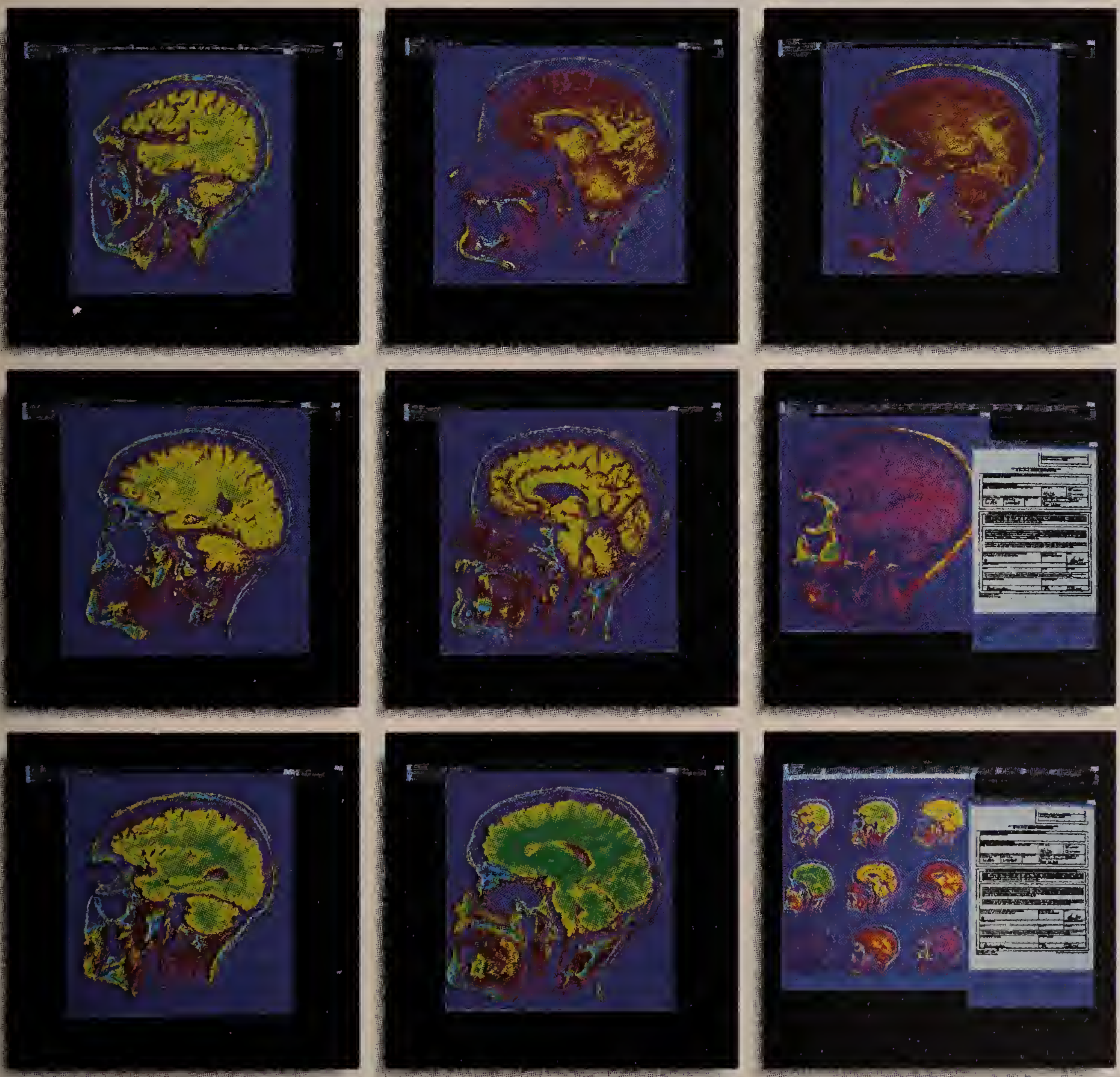

Digital's Ethernet/FDDI, 100 Mb/sec.

See The FAXNet Form on Page #30

Australia leans toward open net

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"There's been talk for years, but this is the closest I've ever seen it come to privatization," said a spokeswoman at the Australian embassy in Washington, D.C. She added that ministers have wrestled with several ideas to open the market.

Some officials favor merging Telecom Australia, OTC Australia and Aussat into a single carrier that would be called Megacom. The government would then allow another, privately owned carrier to fully compete with this service provider.

Others argue that Telecom Australia and OTC Australia should be merged and Aussat should be licensed as a competitor. Then foreign investors could be allowed to join Aussat in creating a full-service carrier to compete with Telecom Australia and OTC Australia.

Still others propose that OTC Australia and Aussat merge and compete against Telecom Australia. So far, observers said the latter two proposals are favored over the Megacom option.

Either way, according to an OTC Australia spokesman, competition could lower service prices by 18% to 30% over the next few years.

John MacDuffie, managing director for AT&T International Communications Services in Sydney, said the government is moving swiftly because privatization of the national carriers would enable it to reduce the federal budget deficit.

Users to benefit from Argentina's net sale

continued from page 27

sible extensions until 2000. The government plans to sell the remaining 40% of Telco North and Telco South to carrier employees, independent Argentine telephone cooperatives and other citizens of the country.

Although the sale of ENTEL is a quick way for the Argentine government to lop off a huge chunk of its $64 billion in foreign debt, financial analysts say the desire to improve network service may be an even bigger motivation for public officials.

"Some people say they need the money. I say it's much more ideological," said a financial analyst familiar with the transaction who requested anonymity. "The phone system in Argentina has been a cocktail party subject for years. It can take 10, 12 or 16 years to get a phone. You may have to dial eight to 10 times to get through. I think the notion of privatizing is quite popular" because people believe it will improve service.

In order to ensure that the public network improves, the Argentine government has set stiff service requirements for the new owners of the phone system. If they fail to meet these requirements, their contract may not be renewed when it comes up for review in 1996.

Among other things, the government is asking the new owners to increase the percentage of local calls completed without difficulties from 49% now to 85% by 1996. Completion rates for long-distance calls between urban areas are supposed to rise from 23% now to 80% by that year.

The new owners are also supposed to reduce the average wait for network repairs from 14.5 days to three days in the same time frame. In addition, over the next three years, the new owners are supposed to reduce the average wait for a new telephone from two years to three months and add another 1.5 million telephone access lines to the 3.2 million now in service, according to Ricardo Fox, an advisor to ENTEL who opened bids for the carrier.

In order to pay for the new plant required to improve service, Bell Atlantic Corp. says it will need another $300 million in revenues from Telco North subscribers. To meet this requirement, the government of Argentina will increase prices for all switched services from both carriers by 72% before handing it over to the new owners in October, Bell Atlantic International's Vall said.

Then, from 1993 to 2000, the rate reductions will set in for all network services. The new owners will be able to get exemptions from these rate decreases if they can prove that cutting prices will earn them less than the 16% return on investment guaranteed by the government.

Brazil permits IVANs to market services

continued from page 27

of telecommunications liberalization in Brazil.

MasterCard has a 9.6K bit/sec dedicated leased-line link from New York to CrediCard S.A., its card-issuing member in Brazil. The ending of restrictions should increase the number of equipment and service options available to CrediCard.

Change will take time

According to Ken Zita, a senior analyst with META Group, a consultancy in Westport, Conn., although Brazil is taking steps to relax restrictions on its telecommunications carriers, the country's telecommunications environment will not be as open as in other countries such as Hong Kong, Mexico or Taiwan.

He said these countries are selling off large equity stakes in their carriers, leading to improved services, while Brazil will still maintain control of Embratel. Change will come in Brazil, he said, but it will take some time.

"There's not going to be a rapid turn in the flexibility of the phone operating company," Zita said.

"In some countries, reform has come very quickly, but Brazil is not one of them."

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PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

First Look

ODS unveils 10BaseT products for its 290 line

Optical Data Systems, Inc. (ODS) recently introduced 10BaseT products that work in conjunction with its newly introduced 290 line of Ethernet concentrators.

The first offering is the **ODS 294-BT,** a 12-port 10BaseT interface that is fully compliant with the Draft 10 version of the evolving 10-BaseT standard. The interface, which links workstation users to the hub, costs $1,995. It is available now.

The **ODS 466** is a 10BaseT transceiver with RJ-45 and attachment unit interfaces, enabling thick-wire Ethernets to be linked to the 10BaseT hub. It costs $175 and is available now.

The **ODS 468** is also a 10-BaseT transceiver with RJ-45 and BNC connectors, enabling thin-wire Ethernets to be linked to the 10BaseT hub. It will be available at the end of July and will cost $450.

Optical Data Systems, Inc., 1101 E. Arapaho Road, Richardson, Texas 75081; (214) 234-6400.

SBE offers token-ring interface for VME bus

SBE, Inc. recently introduced a token-ring interface board for VME bus computers, such as Digital Equipment Corp. VAXes and Sun Microsystems, Inc. workstations.

VCom-33 provides a software-selectable interface to 4M and 16M bit/sec token-ring networks. The card has a Motorola, Inc. 68030 microprocessor that lets it run the network and transport layers of Transmission Control Protocol/Internet Protocol, Open Systems Interconnection and Systems Network Architecture protocols.

The card also uses Texas Instruments, Inc.'s TMS380-C16 microprocessor to perform data-link layer functions including communications between the net and the network interface. It features 1M to 4M bytes of on-board memory.

The product costs $3,600 or $2,950 each for orders of 100 or more. It is expected to ship in September.

SBE, Inc., 2400 Bisso Lane, Concord, Calif. 94520; (415) 680-7722.

Microcom adds modems to link PCs to cellular nets

Units support transmission of 9.6K to 12K bit/sec.

By Tom Smith
New Products Editor

NORWOOD, Mass. — Microcom, Inc. recently introduced modems designed for use on mobile cellular telephone networks.

The new MNP Cellular Modems implement Microcom Network Protocol (MNP) Class 10 for data transmission at 9.6K bit/sec, or up to 12K bit/sec using compression, over low-quality connections. In addition to MNP 10, the modems support MNP 5 and MNP 7 for 3-to-1 data compression.

The modems link portable computers and personal computers to a mobile telephone for communications over a cellular network.

Microcom's MNP Cellular Modems come in two models that work in tandem: the M96, which connects to a cigarette lighter in a vehicle, and the C96, which is attached to a computer at a central site and is used to establish a hookup with the mobile modem. Both have an RS-232 port for connection to a personal computer and an RJ-11 jack for connection to the telephone.

Because both modems support V.22bis, they can communicate with any other modem that supports the standard for 2,400 bit/sec operation, but they are optimized to communicate with each other because they both support MNP 10.

One user, Plymouth Rock Assurance Corp., said the modems have enabled it to reduce the time required to appraise car accident claims from between 10 and 14 days to an hour in some cases.

In the past, the firm had to have photographs taken at the accident scene. The photos were then returned to the home office for a claims adjuster to analyze, according to Bob Badolato, senior data processing specialist for the Boston insurer.

Now, by plugging a camera with disk storage into a personal computer, the picture can be transmitted back to the home office, where a decision can be made about the amount of the settlement. A check is then issued on site.

The C96 costs $899; the M96 costs $999. Both are available 30 days after receipt of order.

Microcom can be reached in writing at 500 River Ridge Drive, Norwood, Mass. 02062, or call (617) 551-1000.

Chipcom releases ONline net management system

SOUTHBOROUGH, Mass. — Chipcom Corp. recently unveiled a net management system for the ONline System Concentrator, its local-area network wiring hub.

The ONline Ethernet Network Management Module is an interface board that resides in the hub and enables a user at an ASCII terminal to perform local and remote configuration, statistics gathering and fault detection.

From the terminal, users can reroute Ethernet traffic on one of three internal buses to either of two other bus channels for load balancing purposes, according to Chipcom. Users can also activate or deactivate ports on the Ethernet interface. The module will provide on-screen notification of a port failure or a failed hub power supply.

Statistics such as packets transmitted and received can be gathered from attached workstations down to the per-port level.

The Ethernet management module will continue to be used when the company introduces a Unix workstation-based network management system later this year, Chipcom said. Users will be able to preserve their investment in the Ethernet module's interface board by downloading new software to the unit, enabling it to communicate with the Unix-based net management station.

The ONline Ethernet Network Management Module will be available later this month for $1,950.

Users that plan to migrate to the Unix-based system will need the Firmware Distribution Kit to download software to the ONline Ethernet Network Management Module. That kit costs $500 and will ship with the Unix-based net management station. Users will also need the Update Distribution Kit, which includes a current release of the management software and costs $250.

For more information, contact Chipcom at Southborough Office Park, 118 Turnpike Road, Southborough, Mass. 01772, or call (508) 460-8900.

Racal-Vadic mux pricing

	7500 Series	7600 Series
Model	■ 7508 (three-slot): $395 ■ 7516 (five-slot): $1,095 ■ 7532 (10-slot): $1,595	■ 7608 (three-slot): $495 ■ 7616 (five-slot): $1,195 ■ 7632 (10-slot): $2,295
Wide-area network interfaces	■ Single link, 19.2K bit/sec: $650 ■ Single link, 9.6K bit/sec, with internal modem: $1,595 ■ Single link, 72K bit/sec: $1,295 ■ Dual link, 9.6K bit/sec each: $995 ■ Dual link, 9.6K bit/sec each, with internal modem: $2,895	■ Single link, up to 384K bit/sec: $1,395
Local voice/data interfaces	■ Four-port asynchronous: $550 ■ Eight-port asynchronous: $895 ■ Four-port asynchronous or synchronous (any combination): $895	■ Four-port synchronous (up to 48K bit/sec): $595 ■ Single-port voice/fax: $995

GRAPHIC BY SUSAN SLATER
SOURCE: RACAL-VADIC, MILPITAS, CALIF.

Racal-Vadic unveils two new mux lines

High-end multiplexers offer choice of support for data only or integrated voice, data and fax.

By Tom Smith
New Products Editor

MILPITAS, Calif. — Racal-Vadic recently introduced two new multiplexer lines, one supporting data only and the other supporting integrated voice, data and facsimile traffic.

The two multiplexer lines are the 7500 Series, which supports analog and digital wide-area links at speeds up to 72K bit/sec, and the 7600 Series, which supports digital data, voice and fax traffic over as many as four wide-area network links, each supporting a maximum of 384K bit/sec.

Both multiplexer lines offer models in three-, five- and 10-slot configurations.

The products are high-end additions to the Racal-Vadic multiplexer product line, which previously consisted of the 7400 Series. That line supported only asynchronous data and maximum WAN links of 19.2K bit/sec.

The 7500 Series is a line of statistical multiplexers that link synchronous and asynchronous data terminal equipment to an analog or digital WAN link at speeds from 9.6K to 72K bit/sec. The company offers several local interface boards for the 7500 Series: a four-port asynchronous, eight-port asynchronous, and four-port asynchronous/synchronous card. Each connects data terminal equipment such as terminals and personal computers to the multiplexer.

The 7500 Series can be configured with a range of wide-area interfaces. The company offers a one-channel interface that supports a digital 19.2K bit/sec link; a two-channel interface, with each channel supporting a digital 9.6K bit/sec link; a one-channel interface with an internal modem for connection to a 9.6K bit/sec analog line; a two-channel interface with an internal modem for connection to two 9.6K bit/sec analog lines; and a single-channel interface operating at 72K bit/sec.

The two-channel interfaces give users several configuration options, according to Racal-Vadic. They enable the multiplexers to perform load balancing and to switch traffic to the other link in the event of a failure.

They also allow a single multiplexer to communicate with two other sites, eliminating the need for separate single-channel multiplexers.

Pricing for 7500 Series models ranges from $395 to $1,595; network interfaces cost from $650 to $2,895 (see graphic).

The 7600 Series is a line of time-division multiplexers that can house up to four WAN interfaces, each supporting a maximum bandwidth of 384K bit/sec for aggregate T-1 bandwidth.

Two local interfaces are offered for the 7600 family. One is a four-port data card for terminals and personal computers, with each port supporting synchronous data at speeds up to 48K bit/sec. The other is a single-port voice card that supports adaptive differential pulse code modulation for compressing voice traffic generated by phones or fax machines to 32K bit/sec.

Pricing for the 7600 Series ranges from $495 to $2,295; network interfaces range in price from $595 to $1,395.

The two new multiplexer lines are available now.

Racal-Vadic can be reached by writing to 1708 McCarthy Blvd., Milpitas, Calif. 95035, or by calling (408) 432-8008.

CONNECTIVITY PROBLEMS

BY JOHN MCQUILLAN

The price of progress is obsolescence

The pace of change in the communications industry is truly remarkable. For example, in the last five years, $1,000 Ethernet cards have given way to $200 Ethernet cards that offer higher performance. A few years ago, packet switches cost $50,000 or more and delivered performance measured in a few hundred packets per second. Now that kind of performance comes in products that cost less than $20,000 and, in some cases, in small units that are priced below $10,000.

Rapid progress and technological breakthroughs are good for the information technology business. However, these advances also have a darker side: They create a continual march toward obsolescence, with many troublesome consequences for users.

Anyone who bought a laptop computer a couple of years ago knows the true meaning of buyer's remorse. Today's models offer more memory, longer battery time, a sharper display and a faster computer. Similarly, network users feel remorse when they realize a deferred purchase would have meant higher performance, a better degree of standards conformity or even the choice of an entirely different vendor with a newer generation of equipment.

> Companies have several generations of technology on the same network.
>
> ▲▲▲

One of the worst consequences of this headlong rush into obsolescence is a definite increase in short-term thinking among users. Most user companies feel that long-range communications planning is really beside the point; if a purchase can't be cost-justified within a couple of years, it isn't worth considering. By the same line of reasoning, any purchase that can be cost-justified within a couple of years is probably worth making.

Another important outcome is that most companies aren't able to change their software or business procedures as rapidly as new hardware is introduced. In fact, it has been a byword in the industry for years that the best approach companies can take is to use "new hardware and old software" — improve the price/performance ratio by using the latest hardware platforms while relying on proven, widely accepted application software and operating systems.

But using this approach doesn't take full advantage of the new equipment base. This is certainly true in the realm of personal computing, where high-powered processors capable of multitasking and supporting large memory address spaces are dedicated to running DOS applications. It is equally true in local-area networks; many LANs are used for trivial tasks such as carrying terminal traffic and printer sharing.

But perhaps the most pernicious aspect of the built-in obsolescence of technology is that many users refuse to recognize it. Everyone knows that computers and communications equipment becomes obsolete in a few years and can be replaced by lower cost, higher performance solutions, but users are often reluctant to discard a working solution.

As a result, most user companies have several generations of technology on the same network. A tremendous amount of time, money and ingenuity goes into providing connectivity and interoperability between some of these antiques and the latest generation of equipment — and that is a clear indication that many users in this industry still haven't come to grips with the reality of relentless obsolescence. ◪

McQuillan is president of McQuillan Consulting in Cambridge, Mass. He assists users and vendors in planning communications systems.

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EDITORIAL

Regulators must ensure diversity in the intelligent net

The goals of competition and diversity in the local loop are in danger of being submerged beneath all the gee-whiz enthusiasm about the forthcoming intelligent public telecommunications network in the U.S.

Just what will the so-called intelligent network do for users? That's not entirely clear yet, but among the new capabilities often associated with it are information service gateways, caller identification, as well as a variety of other features and services that will be supported by Signaling System 7 and other underlying technologies.

The benefits of all these new intelligent network capabilities will be realized more quickly if competition and diversity exist in local loops nationwide. As in other markets, competition will drive prices down and lead to faster innovation among competitors.

Local loop competition can be brought about by encouraging satellite service providers, cable companies and providers of cellular and other radio-based communications services to compete with the telephone companies.

A large part of that encouragement will have to come in the form of strong regulatory initiatives, at both the state and federal levels, to ensure that there is no cross-ownership of competing local loop communications facilities.

Cross-ownership restrictions will have to be designed carefully to safeguard against joint ventures or other arrangements that enable companies to control supposedly competing telephone, cable or satellite facilities that serve the same geographic area.

The debate over cross-ownership of cable and telephone companies, for example, hinges on the diversity issue.

Telephone companies should be allowed to compete with cable companies only if they provide the competing services — for example, video programming — through their own networks.

Telephone companies should not be permitted to buy into the video business by acquiring cable companies because that won't ensure diversity of ownership for competing communications facilities in all geographic areas.

At the time of the AT&T divestiture in 1984, the local loop was considered to be the last and strongest bastion of the telephone companies' monopoly.

Today, nationwide local loop competition is well within the realm of possibility.

That's great news for users — or, rather, it will be if policymakers ensure that there is diversity of ownership in all local calling areas and not just competition among divisions of a new breed of communications industry conglomerates. ◪

OPINIONS

LICENSING

BY PAUL KIRVAN

Beware of the dangers of engineering without a license

If you're a telecommunications consultant and you define yourself and your practice using the term "engineering," be forewarned: Someday soon, you may be cited for practicing the profession of engineering without a license, in which case you may have to either drop the term from your advertising or face legal harassment by groups that object to the fact that you consider yourself an engineer.

Legislation introduced in several states requires that anyone using the term "engineer" in their advertising — even telecommunications engineers — must obtain a state-administered professional engineering license. This is the same practice that traditional engineers who work on buildings, bridges and other public works must follow. Failure to obtain the proper license would make you liable for litigation and fines.

The National Society of Professional Engineers (NSPE) is one of the special interest groups behind this movement. The NSPE points out that telecommunications professionals who call themselves engineers are not state-licensed to practice engineering and argues that these individuals should be subject to the same rules as traditional engineers.

Activity has escalated, albeit quietly, to the legislative level. New Jersey passed a law in May that redefines telecommunications in the context of the engineering profession. The law juxtaposes telecommunications professionals with other engineers, forcing them to adhere to the same licensing requirements, such as a degree in engineering, as other engineers.

New Jersey is not the only state to challenge the use of the term "engineer." According to a recent General Accounting Office report, state engineering boards in six states have filed complaints against individuals for alleged violations of state professional engineering statutes.

In addition to New Jersey, complaints have been filed in Colorado, Michigan, New Mexico, Texas and Washington. In each case, the primary complaint was an individual's use of the term "engineer" somewhere in advertising or other promotional materials. In New Jersey and Texas, the cited individuals modified their descriptive materials to remove the word "engineer." In Michigan, Texas and Washington, the individuals challenged the board's citation with the result that the state board did not pursue the charges.

> Failure to obtain the proper license would make you liable for litigation and fines.
>
> ▲▲▲

New Jersey's law sets a precedent that will encourage special interest groups in other states to lobby for similar legislation.

However, an examination of the legislation in New Jersey reveals that lawmakers apparently did not discuss the issues with anyone in the telecommunications industry. Further examination of the principal legislation and those individuals involved in developing it will probably reveal total ignorance of its true impact. Could it be that the industry is being taken for a ride by people who don't know how to drive?

On the surface, licensing makes sense. The telecommunications industry has never successfully implemented a means of licensing or certifying its members. Several attempts have been made, but the interdisciplinary nature of telecommunications has made it difficult for anyone to assume end-to-end responsibility. Perhaps this new legislation — and similar activities in other states — will compel the industry to finally establish its own guidelines.

Opposition to telecommunications licensing has come from at least two sources to date: the National Association of Radio and Television Engineers (NARTE) and the Building Industry Consulting Service International (BICSI). Reasons for this include:

- Telecommunications engineering differs from other kinds of engineering.
- No states offer any definitive tests in telecommunications engineering.
- Telecommunications is interstate by nature, which would make the states' role questionable.

Now here's the kicker: People working for regulated telephone companies and other regulated carriers are exempt from the proposed rules. But how do you define unregulated equipment subsidies that are part of most telephone operating groups?

Here's another: If you practice engineering within a large company — for example, as a telecommunications manager/engineer — you will probably be exempt from these regulations as well.

Many readers of *Network World* have no doubt practiced traffic engineering at one time or another. You've probably engineered a voice or data network. I'll also bet many of you don't have an engineering degree. If so, people who are misinformed about your business may try to force you to conform to their rules.

What can you do? Find out more and offer your support to one of several professional telecommunications organizations. Contact NARTE at (817) 799-9661 or BICSI at (813) 974-2695. More importantly, write to your state legislators. Stop this before it gets out of hand. ◼

Kirvan is principal of Paul F. Kirvan & Associates, an international communications consulting firm based in Turnersville, N.J.

WHEN IT'S I/O, I/O, OFF THE NETWORK YOU GO, tell us about it in the Opinions pages of *Network World.*

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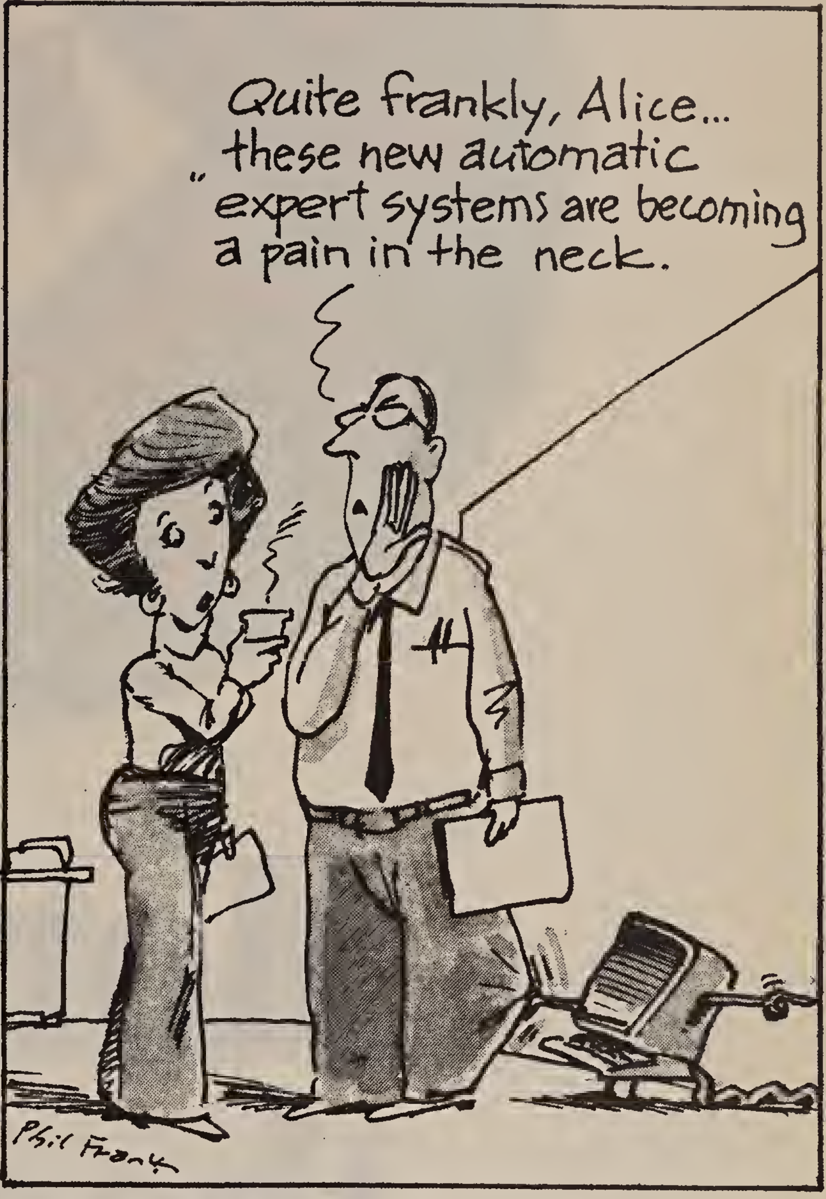
If you'd like to write a column, call Steve Moore, features editor, at (508) 820-7439 or fax your idea to us at (508) 820-3467.

TELETOONS

BY FRANK AND TROISE


Quite frankly, Alice...
".. these new automatic expert systems are becoming a pain in the neck.
Phil Frank

LETTERS

AOS provider speaks out

I'm writing in response to David Wagenhauser's "Alligators in the Swamp" article ("Invasion of the phone snatchers," *NW,* June 11). While referring to the alternative operator services (AOS) provider segment of the competitive long-distance industry, Wagenhauser seeks to set MCI Communications Corp. and US Sprint Communications Co. above the rest, while lumping all other long-distance providers in with the alligators.

Many regional long-distance providers offer a full array of high-quality, innovative services. These providers typically charge no more than AT&T for operator-assisted calls, and in some instances, actually charge less. The AOS companies to which Wagenhauser refers in his article generally offer only operator services to telephones in transient-type locations.

In addition, when MCI or US Sprint offer services to private pay telephones and hospitality locations, they bill surcharges above AT&T rates and pass these surcharges along to the owner of the hotel, motel or pay telephone.

Mid-Atlantic Telecom, Inc. takes issue with the practice of call blocking and visual notification as described in Wagenhauser's article. We require and offer to pay for notice stickers at all transient telephone locations our company serves. Our firm, along with the vast majority of regional long-distance providers, does not practice call blocking and splashing. (Splashing is a term used when callers are overbilled for long-distance rates on calls that travel first to the operator services provider and then to the call destination.)

Historically, premises owners have not cooperated with our efforts to offer the consumer reasonable notification

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Network World *welcomes letters from its readers.*

Letters should be typed, double-spaced and sent to Editor, Network World, *161 Worcester Road, Box 9172, Framingham, Mass. 01701.*

Letters may be edited for space and clarity.

BUYER'S GUIDE

TOKEN-RING NETWORK

OPERATING SOFTWARE

More than token advances

CONTINUED FROM PAGE 1

just two years ago. Crystal ball gazers are predicting that within a year, a 10M bit/sec Ethernet adapter will likely cost the same as a 4M/16M bit/sec token-ring adapter — $350 to $500, depending on the bells and whistles.

Mier is president of Mier Communications, Inc., a Princeton Junction, N.J.-based network consultancy that specializes in customized protocol analysis and planning.

As a result, token ring is increasingly being tapped as the preferred — and, in some cases, mandated — local data transmission technology for enterprise-wide LANs.

Being constrained to token ring as a LAN transmission technology does not mean, however, that connectivity options are limited. This is especially true for critical network operating system software, which facilitates the interconnection and interworking of computers over a LAN.

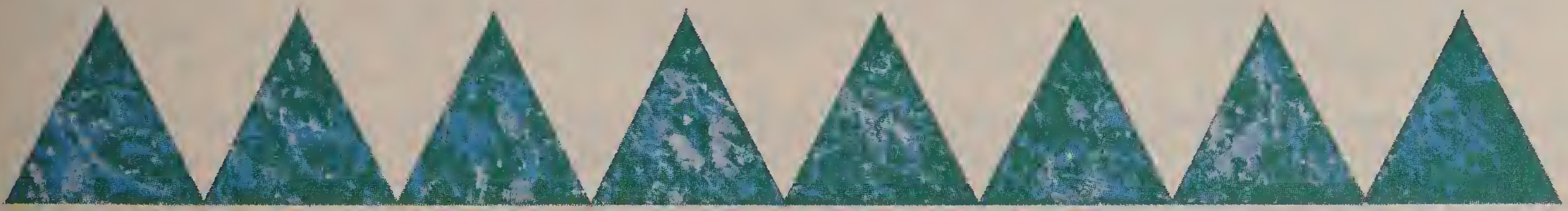
As shown in the chart beginning on page 36, there are already nearly two dozen different network operating system software packages that operate over an IEEE 802.5-compliant token-ring LAN. And this number is growing as vendors of network operating software originally designed for Ethernet operation make the necessary low-level software adaptations to run on token-ring nets.

Network layers

With a VAX token-ring adapter and software driver, users can operate a DECnet or Transmission Control Protocol/Internet Protocol LAN over a token ring, just as interconnected VAXes now run via Digital Equipment Corp.'s DECnet and TCP/IP over Ethernet.

In fact, virtually any system and software that run over Ethernet can be moved over to token ring; the only real limitation today is the availability of software drivers and token-ring adapters for particular hardware platforms. This migration capability is possible because of the standardized IEEE 802.2 Logical Link Control (LLC) interface common to all IEEE 802 LAN specifications — Ethernet, token ring and even token bus.

The IEEE 802.2 LLC interface provides a relatively clean demarcation line. This enables token ring (or any IEEE 802 LAN for that matter) to simultaneously carry the traffic of multiple



different logical subnetworks — each using different transport and network protocols — over the same token-ring media and network.

Indeed, some of the packages included in the charts that run on multitasking Unix or OS/2 servers can simultaneously support two different networks of clients — for example, one running Network Basic I/O System protocols and the other running TCP/IP.

The network and transport protocols supported by the different software packages are key indicators of the general nature of the connectivity that the package provides (see chart, page 38). These protocols can also point out the computer systems that the software allows to be interconnected. About a half-dozen protocol alternatives are available to token-ring network users:

■ **NETBIOS.** A holdover from IBM's earlier PC Network, which gained prominence as the protocol set used with IBM's DOS-oriented PC LAN Program, NETBIOS is still the most widely supported network and transport protocol set in the token-ring world today.

IBM finally unveiled its first token-ring products in 1987. They were based on the IEEE 802.5 standard that had just been approved, so the products had to support 802.2 LLC (a data link protocol). But some of LLC's functions were already being performed by the NETBIOS protocol stack. What IBM did was package NETBIOS more or less intact over the 802.2 LLC protocol and interface. This became known as the NETBIOS Extended User Interface (NETBEUI).

CHART • GUIDE

A *Network World* Buyer's Guide chart comparing the features and prices of various token-ring operating software begins on page 36. Another Buyer's Guide chart comparing different packages for operation over, and connection to, token-ring networks begins on page 38.

The only real difference between software running NETBIOS or NETBEUI over a token ring is that NETBIOS still has to access 802.2 LLC, which is generally provided by the adapter's software driver. Software running NETBEUI, which includes 802.2 LLC, accesses the token-ring adapter directly at the media access control (MAC) layer.

All the same functions and

(continued on page 37)

Soon to overtake Ethernet packages in popularity, software that operates over token-ring LANS is inundating users with choices.

NETWORK WORLD

Token-ring network operating software

Vendor	Software	Description	Capabilities/features	Bridge/gateway capabilities (1)	Price
Apple Computer, Inc. Cupertino, Calif. (408) 996-1010	AppleShare File Server, AppleShare PC	Software for running an AppleShare network (dedicated Macintosh server, PC and Macintosh clients) over token ring	Print server, E-mail, shared disk, file transfer, file server, data base services	Bridging to Ethernet, LocalTalk; gateways: SNA, X.25 (1)	$795 for AppleShare File Server software (requires dedicated, hard-disk Macintosh); $295 for AppleShare PC (per PC node)
	SMB File Transfer; MacAPPC	Makes Macintosh II an SMB client or APPC gateway	File transfer (to SMB server); APPC/SNA peer-to-peer networking	MacAPPC is implemented as a gateway for Macintoshes on LocalTalk	$1,250 for SMB File Transfer (included with Macintosh II Token Ring Adapter), $2,500 for MacAPPC (site license)
Artisoft, Inc. Tucson, Ariz. (602) 293-6363	LANtastic Network Operating System/Adapter Independent 3.0	Peer-to-peer network operating system for interconnecting DOS PCs	Printer sharing, E-mail, CDROM support, voice mail (with E-mail), audit trails, security	NA	$495 per network
AT&T Morristown, N.J. (800) 247-1212	StarGROUP LAN Manager Server	Client/server operating system based on Unix server platform, supporting DOS, Unix and OS/2 clients	E-mail, print server, file server, single server/gateway, router management, centralized LAN/WAN management, LAN Manager, Unix and TCP/IP integration	Bridging to Ethernet; gateways: SNA, asynchronous, X.25, remote client access, OSI-to-TCP/IP, LAN/WAN E-mail	$1,895 to $3,495 for LAN Manager Server software (8 to unlimited users); $1,595 to $7,795 for SNA gateway (8 to 128 users); $1,295 for E-mail gateway; $1,495 for TCP access program; $1,495 for Remote PC gateway; $1,275 for asynchronous gateway; $1,995 to $10,945 for network management configurations
Banyan Systems, Inc. Westborough, Mass. (508) 898-1000	VINES 2.1 and later	Client/server operating system with Unix V-based 386 server, supporting DOS clients (OS/2 client support due 3Q 1990)	E-mail, print server, file transfer, integrated global directory service, memory and application sharing, multi-LAN integration	Bridging to Ethernet, IBM PC Net, Arcnet, Starlan, others; gateways: X.25, asynchronous, SNA, E-mail to SNADS, X.400	$5,995 for VINES/386 network operating system (base price, without options); $2,295 for VINES Token-Ring Bridge Option
CBIS, Inc. Norcross, Ga. (404) 446-1332	Network-OS	Peer-to-peer LAN operating system for DOS-based PCs (no dedicated server), totally IBM NETBIOS-based and LAN hardware-independent	E-mail, printer sharing and selection, CD-ROM support, password security, help screens, encryption, modem sharing	Bridging via server to Ethernet, Arcnet, Starlan, others; gateways: E-mail, on-LAN conferencing	$320 to $1,120 for Network-OS (2 to 7 users); $160 per single-node addition; $1,480 to $2,550 for software license for 8 to 80 users and 81 to 255 users, respectively; $160 for bridging option; $160 to $1,480 for modem-sharing option (1 to 5 modems)
Corvus Systems, Inc. San Jose, Calif. (408) 281-4100	PC/NOS 2.0	Peer-to-peer network operating system for PCs and PS/2s, which also supports client/server capabilities, remote control of other nodes	File server, print server, E-mail, shared disk, modem pooling, application sharing, network security, LAN management	Gateways: SNA, X.25, asynchronous	$1,395 for PC/NOS software (includes driver) per network
Data General Corp. Westborough, Mass. (800) 328-2436	DG/PC Integration	Network operating system based on a DG MV/Series minicomputer as a file, print and data base server, supporting PC and PS/2 (DOS) clients	File transfer, file server, E-mail, printer services (using MS-NET Mail), data base access using NETBIOS applications	Bridging via server to Ethernet; gateways via server to SNA	$850 to $10,200 for MV/Series server software (varies depending on class of server machine); $495 to $595 for client software (per workstation)
Datapoint Corp. San Antonio, Texas (512) 699-7000	DataLAN	Network operating software functionally equivalent to IBM PC LAN Program; allows PC and PS/2 nodes to be configured either as clients or servers	Print server, file server, E-mail, supports IBM PC LAN Program clients on DataLAN servers	Bridging to Ethernet and Arcnet via NETBIOS bridges	$595 to $1,995 for DataLAN software. Adapter vendors need to provide NETBIOS interface and protocol support. For IBM Token-Ring Adapters, this is provided via the IBM LAN Support Program
DCA 10NET Communications Dayton, Ohio (513) 433-2238	10NET Plus for NETBIOS LANs	Peer-to-peer network operating system for DOS-based PCs and PS/2s	E-mail, shared disk, file transfer, print server/spooling, CHAT (direct user-to-user communications), remote job submission, applications sharing, security	Bridging to Ethernet, twisted-pair and fiber-optic LANs; gateways: X.25, X.400, SNA, asynchronous WANs	$195 for 10NET Plus operating software, per PC (DOS) node
FTP Software, Inc. Cambridge, Mass. (617) 868-4878	PC/TCP for DOS	TCP/IP implementation for DOS systems, enabling LAN and off-LAN TCP/IP client/server communications	File transfer (FTP client/server; NFS client), E-mail (SMTP client/server, print server (client), remote login (Telnet), backup	All functions operate across and off-LAN via standard TCP/IP routers, gateways	$400 for PC/TCP for DOS (without NFS client support); $495 PC/TCP for DOS with NFS client support (pricing based on single quantity; volume discounts apply)
	PC/TCP for OS/2	TCP/IP implementation for OS/2 systems, enabling LAN and off-LAN TCP/IP client/server communications	File transfer (FTP client/server), Telnet (client/server), E-mail (SMTP client), print server (client), remote execution (client/server)	All functions operate across and off-LAN via standard TCP/IP routers, gateways	$575 for PC/TCP for OS/2 (pricing based on single quantity; volume discounts apply)
Hewlett-Packard Co. Cupertino, Calif. (800) 752-0900	HP LAN Manager for OS/2 and MS-DOS	Client/server LAN operating software for OS/2-based server, supporting DOS and OS/2 clients	File server, E-mail, print server, software supports peer-to-peer communications (station-to-station messaging)	Bridging to Ethernet (used to access HP LAN Manager/X server); gateways: X.25, SNA, asynchronous (via third party), NETBIOS applications)	$995 for HP LAN Manager for OS/2 and DOS (5-user license); $3,495 for HP LAN Manager for OS/2 and DOS (unlimited user license); $395 for HP ARPA Services 2.0 (TCP/IP protocol support), per DOS node
IBM Armonk, N.Y. (914) 765-1900	OS/2 LAN Server 1.2 (requires OS/2 Extended Edition 1.2)	Client/server LAN operating software for OS/2-based server, supporting DOS and OS/2 clients; requisite OS/2 Extended Edition in server adds integral data base, communications functions	File server, print server, other (remote IPL of DOS clients; remote server-based program execution, location-independent resource naming, multiserver administration)	Bridging to Token Ring (local and remote), PC Network, Ethernet (via IBM 8209); gateways: SNA, asynchronous, X.25. LAN dial-in by remote PC clients	$830 for OS/2 Extended Edition V1.2 (required on server); $1,040 for OS/2 LAN server V1.2; DOS client code (DOS LAN Requestor and IBM LAN Support Program) included for up to 128 users; other separately priced options include Remote NETBIOS Access Facility (for remote DOS client dial-in access); TCP/IP (for OS/2 Extended Edition nodes)
MicroComputer Systems, Inc. Irving, Texas (214) 659-1514	NETBIOS/ix and SMB/ix server program	NETBIOS/ix adds NETBIOS interface and NETBEUI protocol support to Unix; with SMB/ix program, enables Unix V.3 server support for DOS and OS/2 clients	Print server; file server (via either SMB/ix or other Unix applications on Unix system); provides full interoperability between NETBIOS and Unix systems	Bridging to Ethernet supported by this software; gateways can be any Unix or NETBIOS-based applications	$495 to $694 for NetBIOS/ix, per copy (provides Unix System V.3 kernel-resident, streams implementation of NETBIOS APIs and protocols), $1,995 to $6,995 for SMB/ix, per server (from 8- to unlimited-user versions)
NCR Corp. Dayton, Ohio (513)445-5000	NCR LAN Manager 2.0	Client/server LAN operating software for OS/2-based server, supporting DOS and OS/2 clients	File server, shared disk, print server (print spooling), peer services, interstation messaging, disk fault tolerance, remote program execution	WAN gateways are supported via the separate NCR Communications Server	$2,495 for NCR LAN Manager 2.0 software for a configuration of 1 server and 10 clients (cost increases for more clients, is less for fewer); $895 for NCR 16/4 Token-Ring Adapter for either PC/AT or MCA buses
Novell, Inc. Provo, Utah (801) 379-5900	NetWare 286 (Advanced and SFT, V2.15)	LAN operating software for networking DOS, OS/2 and Macintosh workstations via a typically dedicated server	File server, file transfer, print server, shared disk, data base services, security, Message Handling System format support for E-mail	Bridging and routing to Ethernet, Arcnet, Starlan; LocalTalk connection enables AFP file exchange via server; integral asynchronous bridging; gateways: asynchronous, SNA, X.25 (Novell and third-party options)	$1,895 for Entry Level NetWare for up to 8 users; $3,295 for Advanced NetWare for up to 100 users; $4,995 for System Fault Tolerant NetWare 2.15
	NetWare 386 V3.1	LAN operating software for networking DOS, OS/2 and Macintosh workstations via a dedicated 386-based server	File server, file transfer, print server, shared disk, data base services, security, open architecture, 32-bit operation	Bridging and routing to Ethernet, Arcnet, Starlan; LocalTalk connection enables AFP file exchange via server; integral asynchronous bridging; gateways: asynchronous, SNA, X.25 (Novell and third-party options)	$7,995 for NetWare 386 V3.1 operating software for server and up to 250 clients
Sitka Alameda, Calif. (415) 769-8700	TOPS for Macintosh, TOPS for DOS	Peer-to-peer network operating software for linking mainly DOS PCs and Macintoshes (and also Sun/Unix systems); client/server capabilities in all nodes	File server, E-mail, printer sharing/spooling, standard Macintosh interface used to access DOS files, standard DOS commands to access Macintosh files	Any Apple or third-party gateway that bridges and routes AppleTalk network and transport protocols (TOPS protocols run on top)	$249 for TOPS Network Bundle for DOS (includes InBox 3.0 E-mail); $299 for TOPS Network Bundle for Macintosh (includes InBox 3.0 E-mail); $329 for InBox E-mail administrator (Macintosh or DOS)
Syntax Systems, Inc. Auburn, Wash. (206) 833-2525	TotalNET (a family of PC client-to-Unix server software)	Client/server software modules enable Unix/VMS minicomputers to be SMB/NETBIOS or LAN Manager servers to DOS and OS/2 clients	File transfer, file server, print server, E-mail (separate option), server-based remote execution, peer-to-peer/client-to-client messaging, resource sharing	Any third-party bridges or gateways running as DOS, OS/2, Unix or VMS applications are supported	$1,300 for LMserver — Unix/VMS LAN Manager server software, includes LMclient modules for DOS and OS/2 clients (5-user version); $750 for SMBserver software for Unix/VMS minicomputer server; $95 for SMBclient software, per DOS client ($80 for NETBIOS, if required)

SOURCE: MIER COMMUNICATIONS, PRINCETON JUNCTION, N.J.

NETWORK WORLD

Token-ring network operating software (continued)

Vendor	Software	Description	Capabilities/features	Bridge/gateway capabilities (1)	Price
3Com Corp. Santa Clara, Calif. (408) 562-6400	3+Open LAN Manager 1.1	Network operating system software based on an OS/2 server, enabling the interconnection of DOS, OS/2 and Macintosh multivendor networks	File server, shared disk, printer sharing/spooling, resource-usage audit capability, remote program execution, demand-loaded protocol operation	Bridging to Ethernet and LocalTalk; gateways: SNA, X.25, TCP/IP, XNS (to other 3+, 3+Open), X.400 mail gateway	$3,995 for 3+Open LAN Manager Advanced System 1.1 (unlimited users); $1,295 to $1,895 for 3+Open LAN Manager Entry Level 1.1 (5 to 10 users); $2,950 for 3+Open for Macintosh (bundled with 3+Open at no charge until July 31)
Torus Systems, Inc. Redwood City, Calif. (415) 594-9336	Tapestry II LAN Manager	Network operating system software based on an OS/2 server, supporting DOS and OS/2 clients	File server, file transfer, print server, E-mail, shared disk, modem sharing, multiuser calendaring, meeting scheduler, telephone directory facility	Any NETBIOS-compatible bridge or gateway; X.25 gateway	$3,790 for Tapestry II LAN Manager (price for 8-station network); $300 to $400 for each additional station added beyond 8; $3,295 for Torus X.25 NETBIOS Bridge
Ungermann-Bass, Inc. Santa Clara, Calif. (408) 496-0111	NET/ONE LAN Manager	Network operating system software based on an OS/2 server, supporting DOS and OS/2 clients	File server, file transfer, shared disk, print server, access/file security, network administration	Gateway capabilities of OS/2 Extended Edition V1.2 when running as server operating system	$2,995 for Net/One LAN Manager software
Waterloo Microsystems, Inc. Norcross, Ga. (404) 441-9252	Waterloo PORT (PORT Lite version for up to 5 users)	Peer-to-peer LAN operating system for IBM-compatible, DOS PCs	Print server, E-mail, shared disk, file transfer; all-points bulletins, multilevel security, icon or DOS interface	Bridging to Arcnet; gateways: X.25, asynchronous	$2,495 for Waterloo PORT network operating system (for as many as 40 users if protected mode used; as many as 15 otherwise); $695 for PORT Lite (5-user version); $595 for asynchronous Internet gateway; $2,295 for backbone Internet gateway

AFP = AppleTalk Filing Protocol
API = Application program interface
FTP = File Transfer Protocol
IPL = Initial Program Load
MCA = Micro Channel Architecture

NA = Not applicable
NFS = Network File System
SMB = Server Message Block
SMTP = Simple Mail Transfer Protocol
SNADS = SNA Distribution Services

FOOTNOTES
(1) May be integral, extra-priced options, or third-party products.

SOURCE: MIER COMMUNICATIONS, PRINCETON JUNCTION, N.J.

(continued from page 35)

protocols are implemented; the difference is in where the 802.2 LLC protocol is handled and whether the software-to-adapter interface is handled at Layer 2 (802.2 LLC) or Layer 1 (MAC).

Either way may be efficient, depending on the software structure and implementation (both operating software and adapter driver), the bus (Personal Computer, AT, Micro Channel Architecture or Extended Industry Standard Architecture), the bus transfer rate (8 or 16 bit) and the adapter's on-board processor.

■ **TCP/IP.** About a third of the network operating software packages in the accompanying charts support the de facto standard TCP/IP suite, instead of or in addition to NETBIOS.

A host of standardized, TCP/IP-oriented higher level protocols are designed to run over the TCP/IP transport and network protocols — such as File Transfer Protocol, Network File System, Telnet and Simple Mail Transfer Protocol — all of which require that the TCP/IP node assume the role of either a client or a server.

Since TCP/IP has been implemented by virtually every computer vendor, its use as a universal protocol suite for heterogeneous networking environments is gaining steam. TCP/IP is supported on systems ranging from IBM's System/370 mainframes and Personal System/2s to DEC's VAXes and Apple Computer, Inc.'s Macintoshes.

In addition, TCP/IP, which is supplemented by many standard gateway and routing protocols, is a good choice when LAN traffic is frequently routed over wide-area networks or LAN to LAN via WANs.

However, unless the software supplier supports TCP/IP as its primary protocol stack — and very few do — token-ring network managers should be prepared to pay considerably more for TCP/IP support. This is true for 3Com Corp.'s 3+Open, AT&T's StarGroup LAN Manager Server and even for putting TCP/IP on IBM's PS/2.

Novell, Inc. plans later this year to deliver TCP/IP support as part of its NetWare Loadable Module (NLM) design for NetWare 386, along with other dynamically switchable protocol stacks ("Novell, partners air bevy of WAN tools," *NW*, June 18).

■ **AppleTalk.** IBM-compatible personal computers and Macintoshes can be networked over a token ring with software packages from Apple. These include AppleShare, which requires a dedicated hard-disk Macintosh server; AppleShare PC Version 2.0; and TokenTalk, which includes the driver for Apple's token-ring adapter. The systems can also be networked with software from Sitka by using separate packages that run on Macintoshes and personal computers.

Personal computers running TOPS for DOS on a token ring require the same TokenTalk driver that Apple provides with its AppleShare PC Version 2.0 software for IBM's Personal Computer Token-Ring Adapters. Unlike Apple's dedicated Macintosh server approach, Sitka's software enables Macintoshes and personal computers to exchange files as peers; any node can assume a server or client role.

TOPS functions over the same network and transport protocols that Apple uses (called the Datagram Delivery Protocol and Apple Transport Protocol, respectively), but it uses its own higher level protocols on top of them. The TOPS Filing Protocol, for example, is functionally equivalent to the AppleTalk Filing Protocol (AFP) but permits DOS systems and Macintoshes to exchange files as peers.

LAN software leaders Novell and 3Com are each working diligently to build AppleTalk protocol support into their systems. 3Com, in fact, just added limited AppleTalk support to its 3+Open LAN Manager Version 1.1. The current implementation permits Macintosh nodes to communicate with the 3+Open server using AppleTalk protocols over either an Ethernet or Apple LocalTalk LAN, though not over a token ring.

A subsequent release of 3+Open for Mac will add the capability for Macintosh-to-server AppleTalk-compatible communications over a token ring. According to 3Com, its server appears as an AppleTalk router to LAN-attached Macintoshes.

Similarly, Novell's support for AppleTalk and Macintoshes is limited. Currently, Macintoshes can communicate with a NetWare 386 Version 3.1 server through either a LocalTalk or Ethernet LAN, but not via a token ring.

> TCP/IP is a good choice when LAN traffic is frequently routed over wide-area nets or LAN to LAN via WANs.
>
> ▲▲▲

The Novell server supports AFP, thus appearing as an AppleShare file server to attached Macintoshes. Unlike with NetWare DOS- and OS/2-based clients, however, Macintosh clients do not run any NetWare client software. They require the same AppleTalk client protocol software included with the Macintosh operating system. Therefore, only Apple and Sitka support Macintosh-to-AppleTalk communications over token ring.

A source at 3Com says the delay in AppleTalk support over the token ring is due to the changes Apple made in Phase 2 of AppleTalk last year, which added router and protocol complexity.

Others believe that both Novell and 3Com are holding off to ensure that their AppleTalk pro-

(continued on page 43)

Software features

The chart on page 36 compares and contrasts the salient differences among the features of network operating system software packages. Most packages provide for client/server networking between an Intel Corp. 80286- or 80386-based server and personal computers (including Personal System/2s running DOS or the DOS emulation mode of OS/2).

The "Description" column specifies whether the software follows the client/server model or whether communications is peer to peer.

Products that purport to be peer to peer may still use client/server protocols for certain operations such as file transfer. However, peer-to-peer products either do not require a dedicated server (such as Artisoft, Inc.'s LANtastic, CBIS, Inc.'s Network-OS and Corvus Systems, Inc.'s PC-NOS) or any node can be configured as a client or a server (such as Datapoint Corp.'s DataLAN and Sitka's TOPS for DOS).

The "Capabilities/features provided" column offers a thumbnail profile of the major network-oriented features each package offers. The primary features include the sharing and exchange of files, printer sharing, print spooling and electronic mail.

"Shared disk" means that disk storage on a station other than the user's workstation is supported; it also usually means that diskless workstations are supported.

The "Bridge/gateway" column points out whether it is possible to bridge to other local-area network types or gateways to wide-area networks. These capabilities may be provided as an integral feature of the software (as bridging is with Novell, Inc.'s NetWare), available from third parties or from the software vendor as separately priced options.

The chart includes six OEMs of Microsoft Corp.'s LAN Manager software, each offering different protocol support, options and so on.

Microsoft now also markets LAN Manager directly to end users but declined to participate in this survey.

Each company listed was allowed to include as many as two appreciably different token-ring LAN software products.

IBM preferred not to include its PC LAN Program, and 3Com Corp. chose not to include its older 3+Share operating system software. These products account for a significant portion of the installed base of token-ring net operating system software.

— Edwin Mier

Products that operate over or connect to token ring (continued on page 43)

Vendor	Software	Network/transport protocols supported	Application software interfaces	Client/server protocols	Workstations and servers supported	Adapters supported	Software drivers/operating environments
Apple Computer, Inc. Cupertino, Calif. (408) 996-1010	AppleShare File Server, AppleShare PC	AppleTalk/ TokenTalk	Apple Data Stream Protocol	AppleShare/AFP	W: PC, XT, AT or compatible; S/W: Mac II, SE or SE/30	PC: IBM; Macintosh: Apple, Tridata Systems, Inc., Avatar Technologies, Inc., H3 Systems	Apple supplies driver for Mac II with its NuBus adapter and for IBM adapter on PC (shipped with AppleShare PV 2.0); others from adapter vendor; DOS 3.3 or later required on PCs running as AppleTalk clients
	SMB File Transfer; MacAPPC	NETBEUI or APPC	NETBIOS or APPC APIs	SMB	SMB client: Mac II; APPC peer: Mac II	Apple	Apple supplies driver for SMB-client operation with Macintosh NuBus adapter; APPC driver supplied with Apple MacAPPC software
Artisoft, Inc. Tucson, Ariz. (602) 293-6363	LANtastic NOS/AI 3.0	NETBIOS	NETBIOS	Proprietary	W: PC, XT, AT, PS/2, 386-based and compatible	IBM, Western Digital Corp., Gateway Communications, Inc.	Drivers from adapter vendors (IBM requires LAN Support Program 1.1; Gateway Communications requires NETBIOS v1.52); adapters must support NETBIOS; all nodes run DOS 3.1 or later (3.2 not recommended)
AT&T New York (212) 605-5500	StarGroup LAN Manager server	NETBIOS encapsulated within OSI (TOP OSI)	NETBIOS, TLI, LAN Manager APIs	SMB	W: any IBM XT, AT, PS/2 or compatible (PC AT or MCA bus); S: AT&T or Compaq Computer Corp. 386 system (PC AT or MCA bus)	IBM	AT&T supplies drivers for both server and clients; server software supports the Microsoft Corp. NDIS adapter interface specification; server must be running AT&T Unix System V, 3.2.2, clients run either DOS 3.1 or later, or OS/2 1.1
Banyan Systems, Inc. Westborough, Mass. (508) 898-1000	VINES 2.1 and later	NETBIOS, NETBEUI, TCP/IP, XNS	NETBIOS, VINES APIs	SMB, FTP (NFS and Telnet via third-party software)	W: any DOS-compatible PC; S/W: 386-based system, including PS/2 (Models 70, 80) or Banyan 386 servers (PC AT or MCA bus)	IBM, Proteon, Inc., 3Com Corp.	Server driver provided by Banyan in VINES 2.1 or later (may also require, or run with, adapter vendor's driver software); adapter vendor's driver software used in PC clients, which require DOS 2.10 or later (Banyan client software provides for boot-up)
CBIS, Inc. Norcross, Ga. (404) 446-1332	Network-OS	Runs as NETBIOS application; protocols dependent on adapter used	NETBIOS	SMB	W/S: IBM PC, AT, XT, PS/2 and compatible (PC, AT, MCA bus)	IBM, Sytek, Inc., Ungermann-Bass, Inc., Pure Data	Drivers supplied by the adapter vendor (in the case of IBM, nodes run the IBM LAN Support Program); adapter vendor's driver package must provide a true NETBIOS software interface; all nodes must be running DOS 3.0 or later
Corvus Systems, Inc. San Jose, Calif. (408) 281-4100	PC/NOS 2.0	NETBIOS, NETBEUI	NETBIOS	Proprietary	W/S: IBM PC XT, AT, PS/2 and compatible, 386 (PC AT or MCA bus)	IBM, Madge Networks, Ltd., Texas Instruments, Inc.	Corvus supplies driver (shipped with PC/NOS 2.0); nodes need to run DOS 3.0 or later
Data General Corp. Westborough, Mass. (508) 366-8911	DG/PC* Integration	NETBIOS, OSI	NETBIOS	SMB	W: IBM PC, PS/2 or DG PC (PC AT or MCA bus); S: DG MV family minis	IBM, 3Com; DG	DG supplies drivers; requires DOS 3.1 or later on all client workstations; DG driver; MV family mini requires AOS/VS 7.5 or later
Datapoint Corp. San Antonio, Texas (512) 699-7000	DataLAN	NETBIOS	NETBIOS	SMB	W/S: IBM PC, XT, AT, PS/2 and compatibles (PC, AT, MCA bus); any DOS system running IBM PC LAN Program supported as client	IBM, Gateway Communications	Drivers supplied by adapter vendors (IBM LAN Support program for IBM adapters); DataLAN is functionally equivalent to IBM PC LAN Program (PC LAN Program clients are supported by DataLAN servers); all PC nodes need to run DOS 3.1 or later
DCA 10NET Communications Dayton, Ohio (513) 433-2238	10NET Plus for NETBIOS LANs	NETBIOS, NETBIEU, OSI, TCP/IP	NETBIOS	SMB	W/S: any PC, XT or AT (PC or MCA bus)	Excelan, Inc., Novell, Inc., 3Com, TRW, Inc., Western Digital, Ungermann-Bass	Drivers are supplied by the respective adapter vendor; adapters must support/provide NETBIOS interface and protocols; DOS 3.X or later required in each PC node
DSC Communications Corp. Plano, Texas (214) 519-3000	DSC NEXOS (286 or 386 versions)	NETBIOS, proprietary	NetBIOS	Proprietary	W: PC, XT, AT or 386-based system (PC AT, MCA or EISA bus); S: dedicated 80286- or 80386-based system (PC AT or EISA bus)	IBM, Proteon, Madge	Driver for server adapter included in the NEXOS operating system (286 or 386 version, 2.70 or later). PC workstations need to run DOS 3.1 or later; for IBM or Proteon adapters, need IBM LAN Support Program (Madge provides own driver)
FTP Software, Inc. Cambridge, Mass. (617) 868-4878	PC/TCP for DOS	TCP/IP, NETBIOS over TCP/IP (optional)	NETBIOS, Berkeley Sockets, Sun Microsystems, Inc. RPC	NFS, full TCP/IP set (FTP, Telnet, SMTP)	W/S: any DOS system (PC AT bus); S: any system supporting TCP/IP	IBM, Proteon, 3Com, Western Digital	All drivers supplied by FTP (equivalent of IBM LAN Support Program); PC nodes need to run DOS 2.X or later (DOS 3.1 or later is required if DOS node is running NFS client service)
	PC/TCP for OS/2	TCP/IP	Berkeley Sockets, Sun RPC	Full TCP/IP set (FTP, Telnet, SMTP)	W/S: any OS/2 system, standard or Extended Edition version (NDIS-compliant interface); S: any system supporting TCP/IP	IBM, 3Com, Western Digital	FTP supplies NDIS-compliant driver with each OS/2 token-ring adapter card
Hewlett-Packard Co. Palo Alto, Calif. (415) 857-1501	HP LAN Manager for OS/2 and MS-DOS	NETBIOS, NETBEUI, TCP/IP, XNS	NETBIOS, ARPA-Berkeley Sockets, LAN Manager APIs (including Named Pipes)	SMB, Telnet, FTP, ARPA-Berkeley Sockets RPC	W: PC, XT AT, PS/2, HP Vectra or compatible (PC AT, MCA bus); S: IBM PC AT, PS/2, HP Vectra or compatible (MCA or EISA bus); NDIS-compliant interface	IBM, 3Com	OS/2 clients or servers, running OS/2 1.1, use the NDIS adapter interface; MS-DOS clients, running DOS 3.1 or later, may also use NDIS-compliant adapters (NDIS driver supplied by HP with its LAN Manager)
IBM Armonk, N.Y. (914) 765-1900	OS/2 LAN Server 1.2 (requires OS/2 Extended Edition 1.2)	NETBEUI, APPC, direct to 802.2 LLC (1)	NETBIOS, APPC APIs	SMB	W: PC, XT, AT, PS/2 (PC, AT or MCA bus); S: 80286- or 80386-based systems (minimum 30M bytes storage; PC AT or MCA bus)	IBM	Driver for OS/2 nodes included in OS/2 Extended Edition 1.2 (must run on server); OS/2 Extended Edition Communications Manager also provides NETBIOS interface and APPC APIs; DOS client code (IBM LAN Support Program and LAN Requestor) is shipped with OS/2 LAN Server; provides driver and NETBIOS for DOS clients; separate APPC/PC software required for DOS-system APPC support
MicroComputer Systems, Inc. Irving, Texas (214) 659-1514	NETBIOS/ix, SMB/ix Server Program	NETBEUI, NETBIOS over TCP/IP or OSI (TOP OSI)	NETBIOS, TLI streams, LM/X APIs, Berkeley Sockets	SMB (including extended SMB requests)	W: PCs running DOS, OS/2, Unix or LM/X systems; S: any Unix System V.3 (PC AT, VME, MultiBus I, EISA bus)	Proteon, others (depending on hardware platform)	Driver for Proteon PC AT, VME and MultiBus adapters supplied by MCS; NETBIOS is a Unix III kernel-resident streams implementation of an IBM-compatible NETBIOS API; SMB/ix runs as Unix application, providing server functions to DOS and OS/2 clients; server runs Unix III or later
NCR Corp. Dayton, Ohio (513) 445-5000	NCR LAN Manager 2.0	NETBEUI	NETBIOS, LAN Manager APIs (including Named Pipes)	SMB	W: any DOS or OS/2 system; S: 80286- or 80386-based systems (PC AT or MCA bus)	IBM, NCR, 3Com	NCR supplies the driver for NCR adapters (PC AT or MCA bus versions); 3Com supplies drivers for its adapters; Microsoft for IBM adapters; server requires OS/2 1.1; workstations run either OS/2 1.1 or 1.2, or DOS 3.1 or later
Novell, Inc. Provo, Utah (801) 379-5900	NetWare 286 (Advanced and SFT 2.15)	IPX/SPX (AppleTalk/AFP via bridged link)	IPX/SPX, NETBIOS (clients only); others (2)	Proprietary (Telnet, FTP via third-party software)	W: PC, XT, AT and compatible systems; Macintosh via LocalTalk or EtherTalk; S: 80286- and 80386-based (PC AT, MCA, EISA)	IBM, Olicom (Novell-certified), others	Novell supplies driver for IBM adapter; others supplied by adapter vendors; clients run either DOS 2.0 or later (with IBM LAN Support Program), or OS/2 1.0, 1.1 or 1.2 (standard or Extended Edition); dedicated servers run only NetWare O/S

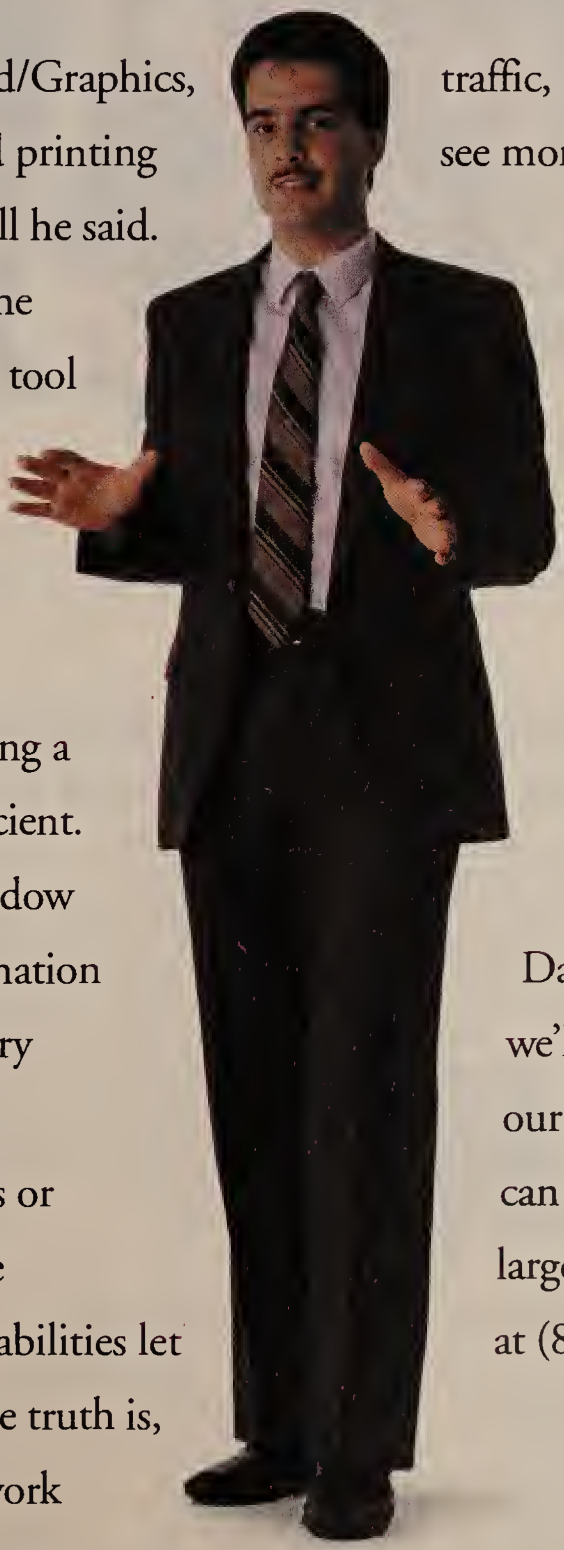
AFP = AppleTalk Filing Protocol
API = Application program interface
EISA = Extended Industry Standard Architecture
FTP = File Transfer Protocol
IPX/SPX = Novell's Internet Packet Exchange/Sequenced Packet Exchange
LM/X = LAN Manager for Unix
MAC = Media access control
MCA = IBM's Micro Channel Architecture
NDIS = Microsoft's Network Driver Interface Specification
NETBIOS = Network Basic I/O System
NETBEUI = NETBIOS Extended User Interface
NFS = Network File System
RPC = Remote procedure call
S = Server platform
SMB = Server Message Block
SMTP = Simple Mail Transfer Protocol
TLI = AT&T Unix V transport layer interface
W = Workstation platform

FOOTNOTES:
(1) Used only for remote Initial Program Load over token ring.
(2) NetWare 3.1 supports other applications interfaces as follows: APPC APIs on server only; TLI on server and DOS clients only; and Named Pipes and other OS/2 APIs on OS/2 and DOS clients only.
(3) For DOS workstations only.

SOURCE: MIER COMMUNICATIONS, PRINCETON JUNCTION, N.J.

"Network Managers Are Blind...

...Without the Window Vitalink's WANmanager Gives Them."



That's what Damian Drewek of Quad/Graphics, Inc., the nation's largest privately held printing company, told us. In fact, that's not all he said. Damian went on to emphasize how the WANmanager network management tool saves time and resources. But that's exactly what you should expect from Vitalink, the LAN internetworking specialist you can trust.

With the WANmanager, managing a network is now simpler and more efficient. That's because its graphic display window lets you view up-to-the-second information on the health and performance of every single part of your network.

Plus, if you're adding new devices or departments are being rearranged, the WANmanager's troubleshooting capabilities let you see problems instantly. The simple truth is, when it comes to watching your network traffic, the WANmanager from Vitalink lets you see more of it all at one time.

And because the WANmanager can also do performance analysis, you can now deliver even higher quality network services. It can even help you identify patterns and trends in network activity in order to distinguish normal from abnormal, which in turn leads to increased productivity for both network managers and users.

If you'd like to see for yourself, ask Damian, or better yet ask Vitalink and we'll show you how the WANmanager and our bridges, routers, and bridge/routers can really help you manage and build large, multi-vendor networks. Just call us at (800) 767-4533.

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MONO

Traditional PC LAN

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Data General's line of Novell NetWare solutions brings transparent networking and distributed applications to all your PC clients.

To learn more about how an AViiON server with Novell's Portable NetWare can bring more power and more applications to your LAN, call the distributors listed below or 1-800-DATAGEN. Also, ask about Data General's full line of PCs.

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Greenville, SC 29616
Sales: 800-332-2222
Customer Support: 800-332-2299
Technical Support: 800-332-2315
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Western Microtechnology, Inc.
1637 North Brian Street
Orange, CA 92667
(714) 637-0200

14636 N.E. 95th Street
Redmond, WA 98052
(206) 881-6737

6837 Nancy Ridge Drive
San Diego, CA 92121
(619) 453-8430

12900 Saratoga Avenue
Saratoga, CA 95070
(408) 725-1660

28720 Roadside Drive
Agoura Hills, CA 91301
(818) 707-0377

1800 N.W. 169th Place
Beaverton, OR 97006
(503) 629-2082

20 Blanchard Road
Burlington, MA 01803
(617) 273-2800

2545 Torpley Road
Carrollton, TX 75006
(214) 416-0103

264 Passaic Avenue
Fairfield, NJ 07006
(201) 882-4999

Four Eves Drive
Marlton, NJ 08053
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NETWORLD 90℠ DALLAS

September 10-13, 1990 • Dallas Convention Center

NetWorld 90 Dallas has moved to a site almost as large as Texas — the Dallas Convention Center. More than 400 exhibitors will showcase the latest technology that links your information systems together, from LANs in the corner office to strategic networks that span the globe. NetWorld 90 Dallas needs no further introduction; the show has become the industry's hottest high technology event, according to exhibitors and attendees alike!

Professionals do need to make the right connections in order to succeed in business, and planning makes the difference in finding the solutions for your business needs.

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THE INDUSTRY STANDARD

Products that operate over or connect to token ring (continued from page 38)

Vendor	Software	Network/transport protocols supported	Application software interfaces	Client/server protocols	Workstations and servers supported	Adapters supported	Software drivers/operating environments
Novell (continued)	NetWare 386 3.1	IPX/SPX (AppleTalk/AFP via bridged link)	IPX/SPX, NETBIOS (clients only), others	Proprietary, NetWise RPC	W: PC, XT, AT and compatible systems; Macintosh via LocalTalk or EtherTalk; S: 80286- and 80386-based (PC AT, MCA, EISA)	IBM, Novell, Proteon, Tiara Computer Systems, Inc., Olicom (Novell-certified)	Currently, only Olicom adapter/driver is Novell-certified for NetWare 386; others also work; Novell supplies driver only for IBM, Novell server adapters; clients run DOS 3.0 or later, or OS/2 1.0, 1.1, 1.2 (standard or Extended Edition)
Sitka **Alameda, Calif.** **(415) 769-8700**	TOPS for Mac, TOPS for DOS	ATP/DDP, same as AppleTalk	DOS or Mac OS calls for file or disk access are intercepted by TOPS system	TFP (equivalent to AFP)	Any Macintosh or DOS machine running relevant TOPS, with token-ring adapter	Same as supported by Apple for Macintosh and DOS machines	Macintosh driver (same as used for Apple TokenTalk) supplied by adapter vendor; Apple PC driver (supplied with AppleShare PC 2.0 for IBM Token-Ring Adapters) is used by TOPS on PC nodes; Macintoshes run System 6.0.5 or later; PCs run DOS 3.0 or later
Syntax Systems, Inc. **Auburn, Wash.** **(206) 833-2525**	TotalNET PC client-to-Unix server software	NETBIOS, TCP/IP	NETBIOS, LAN Manager APIs (including Named Pipes)	SMB	W: DOS and OS/2 (PC AT or MCA bus); S: Unix or VMS systems (MultiBus, VMS, Q-bus, BI bus, others)	CMC, Excelan, IBM, 3Com (for DOS clients), Western Digital, others	Unix servers require TCP/IP and adapter from Unix vendor; run Unix System V, BSD 4.X. VMS servers (VMS 4.X, 5.X) require Excelan hardware-based TCP, Multinet or The Wollongong Group, Inc. Pathway TCP/IP over DEC controllers; clients run DOS 3.0 or later, Xenix or OS/2. Drivers from adapter vendors
3Com Corp. **Santa Clara, Calif.** **(408) 562-6400**	3+ Open LAN Manager 1.1	NETBIOS, NETBEUI, TCP/IP, XNS	NETBIOS, APPC, Unix TLI, LAN Manager APIs (including Named Pipes)	SMB, Telnet, FTP, AppleShare/AFP (via bridged server link)	W: PC, XT, AT, PS/2 and compatible systems (PC AT or MCA bus); Macintosh via bridged server link; S: 80286- and 80386-based (PC AT or MCA bus)	IBM, 3Com, others with NDIS-compliant driver	3Com provides NDIS-compliant drivers for IBM and 3Com adapters for server running OS/2 1.1, and clients running OS/2 or DOS 3.1 or later; Macintoshes run native Mac O/S, connect to server via bridged LocalTalk or Ethernet segment; drivers are the same as used for AppleTalk/EtherTalk
Torus Systems, Inc. **Redwood City, Calif.** **(415) 594-9336**	Tapestry II LAN Manager	NETBEUI, compact version of NETBIOS	NETBIOS, LAN Manager APIs (including Named Pipes)	SMB	W: PC, XT, AT, PS/2 and compatibles (PC AT or MCA bus); S: 80286- and 80386-based (PC AT or MCA bus)	IBM, others providing either MAC layer, 802.2 or NETBIOS interface	Adapter vendor supplies driver and interfaces via MAC layer (nodes run NETBEUI protocols from Torus), or adapter provides full NETBIOS interface; server runs OS/2 (supplied with Tapestry); clients run OS/2 or DOS 3.3
Ungermann-Bass, Inc. **Santa Clara, Calif.** **(408) 496-0111**	NET/ONE LAN Manager	NETBIOS, TCP/IP, XNS, direct to 802.2 LLC (3)	LAN Manager APIs (including Named Pipes)	SMB	W: PC, XT, AT; S: PC AT and compatible systems (PC AT, MCA or EISA bus)	IBM, UB	Server driver supplied by UB or IBM, depending on adapter (IBM adapter driver supplied in OS/2 Extended Edition 1.2, which must then run on server; UB driver runs with OS/2 1.1 on server); client workstations run either OS/2 or DOS
Waterloo Microsystems, Inc. **Norcross, Ga.** **(404) 441-9252**	Waterloo PORT, PORT Lite (Lite serves up to 5 users)	NETBIOS	NETBIOS	Proprietary	PC, XT, AT, PS/2 and compatibles (PC, PC AT or MCA bus); server software needs extended memory, supports protected mode	IBM, Madge	Waterloo supplies driver (equivalent of IBM LAN Support Program for IBM Token-Ring Adapters); Madge supplies driver for its adapters; all nodes run DOS (3.1 and later recommended)

AFP = AppleTalk Filing Protocol
API = Application program interface
EISA = Extended Industry Standard Architecture
FTP = File Transfer Protocol
IPX/SPX = Novell's Internet Packet Exchange/Sequenced Packet Exchange
LM/X = LAN Manager for Unix
MAC = Media access control
MCA = IBM's Micro Channel Architecture
NDIS = Microsoft's Network Driver Interface Specification

NETBIOS = Network Basic I/O System
NETBEUI = NETBIOS Extended User Interface
NFS = Network File System
RPC = Remote procedure call
S = Server platform
SMB = Server Message Block
SMTP = Simple Mail Transfer Protocol
TLI = AT&T Unix V transport layer interface
W = Workstation platform

FOOTNOTES
(1) Used only for remote Initial Program Load over token ring.
(2) NetWare 3.1 supports other application interfaces as follows: APPC APIs on server only; Unix TLI on server and DOS clients only; and Named Pipes and other OS/2 APIs on OS/2 and DOS clients only.
(3) For DOS workstations only.

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tocol support is tested for compatibility with the next version of the Macintosh operating system — System 7.0, which is expected soon from Apple.

In addition, relatively few vendors offer a range of token-ring adapters for the Macintosh computer. Apple's token-ring adapter works only on the latest Macintosh II line.

Just in the last few months have other third-party Macintosh token-ring adapters been announced — notably by Avatar Technologies, Inc. and Tri-Data Systems, Inc. — which support both the Macintosh II and the earlier Macintosh SE line.

Tri-Data, in fact, boasts full compatibility for Apple's Phase II TokenTalk with its LanWay TR 16/4 adapters for the Macintosh II and SE/30, which each cost $1,095.

■ **Open Systems Interconnection.** A handful of network operating system software vendors currently support OSI network and transport protocols over a token ring.

In most of these cases, such as with AT&T's LAN Manager Server and Micro Computer Systems Consultants, Inc.'s NetBios/ix software, the OSI protocols are only supported for carrying NETBIOS protocol packets encapsulated within the OSI protocols.

Running NETBIOS within OSI in this fashion is one way for users to begin addressing migration to OSI within their organizations.

The way NETBIOS is mapped and interfaced to the OSI protocols has been standardized by the MAP/TOP Users Group in a specification called TOP OSI (also referred to as TOP NETBIOS).

There is some duplication of protocol effort in encapsulating NETBIOS within OSI, but it does enable existing applications and software interfaces — most of which are NETBIOS-based — to be transported within a partial, lower level OSI protocol stack.

Because the OSI protocols are new kids on the LAN block, so to speak, current implementations require more processing than either a straight NETBIOS or TCP/IP protocol implementation.

Most users believe that when OSI protocol implementations are refined in subsequent releases, their effect on traffic delays and throughput should be ameliorated.

Then, too, because bona fide OSI applications access OSI protocol stacks directly, rather than through a NETBIOS interface conversion, OSI-based LAN traffic should experience little additional delay, compared to either NETBIOS or TCP/IP.

■ **Proprietary Xerox Network Systems and Internetwork Packet Exchange**

(continued on page 44)

Not yet taking the plunge

The local-area network software packages of some prominent vendors still do not run over token ring. Among these are packages from minicomputer vendors such as Digital Equipment Corp., Hewlett-Packard Co. and NCR Corp., whose networking software and applications run primarily on their own proprietary hardware platforms — DEC's VAX, HP's HP 3000 and NCR's Tower.

Making the leap from Ethernet to token ring means not only tweaking software, but also developing token-ring adapters for their own proprietary computer bus designs.

But even these traditional Ethernet supporters are beginning to respond to the rising prominence of token ring in the marketplace.

Both HP and NCR, for instance, are licensees of Microsoft Corp.'s LAN Manager, and both offer their own LAN Manager adaptations for token-ring-attached 80286- and 80386-based personal computers (see chart, page 38).

Currently, neither HP nor NCR offers token-ring support for their respective proprietary minicomputer systems, but that may soon change. NCR, for example, offers an NCR Tower-based NetWare package (an adaptation of Portable NetWare on Tower's Unix).

At this time, Tower can connect directly only to Ethernet, but NCR offers a personal computer-based implementation of Portable NetWare's remote bridge so users can bridge the Ethernet-attached Tower minicomputer to personal computers on a token-ring LAN.

A token-ring adapter for Tower is also in the works.

Data General Corp., on the other hand, has already adapted its proprietary minicomputer for token-ring operation. The DG/PC*Integration package enables personal computer and IBM Personal System/2 clients (running DOS or DOS-emulation mode of OS/2 only) to access any DG MV minicomputer as a file, print and data base server via a token-ring network.

For strategic and marketing reasons, it is unlikely that DEC will jump on the token-ring bandwagon for the short term. For now, VMS- or Ultrix-based VAXes attach to an Ethernet and communicate with devices on a token ring via bridges or routers.

Third-party adapter vendors will likely deliver token-ring adapters and driver software for the VAX before DEC does.

— *Edwin Mier*

More than token advances

continued from page 43

(IPX). 3Com adopted its own implementation of XNS protocols years ago with its first 3+ networking products. Now the company must continue to maintain support for the proprietary protocols in its latest 3+Open product.

Thus, while NETBIOS is the primary protocol stack for 3+Open, 3Com continues to support XNS as a secondary protocol.

3Com is pursuing a dynamic protocol architecture similar to Novell's NLM, which permits clients to swap out one protocol stack with another as connectivity needs dictate. So far, the company has succeeded in intermixing TCP/IP, NETBIOS and XNS, and plans to add OSI and AppleTalk in future releases.

Until Novell delivers on its multiprotocol support promise, NetWare LANs will remain based on Novell's proprietary IPX/Sequenced Packet Exchange (SPX) protocols.

While NetWare 386 supports NETBIOS applications on DOS NetWare client workstations, it does not support NETBIOS-based communications over the NetWare LAN — token ring or otherwise.

Instead, the NetWare client software intercepts the NETBIOS software calls, then converts them to IPX/SPX protocol equivalents for communications over the token ring to the NetWare server.

■ **Advanced Program-to-Program Communications.** Several network operating system software vendors have stated their intent to support IBM's APPC protocol stack, including 3Com, which will support it as yet another option within 3+Open's Dynamic Protocol Architecture. However, very few have delivered on their promises yet.

Based on interviews with many vendors, most appear to be taking a wait-and-see approach before expending any sizable development effort toward implementing APPC.

Of the software vendors profiled here, only IBM and Apple currently offer a third-party APPC option. For a $2,500 site license, a network of Macintoshes — ostensibly on an AppleTalk LAN — can access an IBM APPC network via a Macintosh II gateway.

Apple explains that its APPC product, which has been tested by IBM for compatibility, allows the gateway Macintosh to appear as a PU Node Type 2.1 to the IBM network. It then allocates logical unit sessions to other Macintosh workstations as required over the AppleTalk LAN. Only the Macintosh gateway maintains the LU 6.2 presence and appearance to the IBM network.

Apple's approach burdens only the gateway with the hefty memory and processing requirements of APPC — one of APPC's two significant drawbacks. The other disadvantage is that very few distributed Systems Network Architecture applications have been written to APPC, and the number of third-party implementors of the IBM proprietary stack are even fewer.

APPC requires several hundred kilobytes of memory — some say as much as 500K bytes. IBM includes APPC with the Communications Manager portion of its OS/2 Extended Edition, which has also been lambasted as a memory hog. Around 5M bytes is now required as a minimum for an OS/2 Extended Edition system.

Notably, IBM also supports NETBEUI so as not to completely shut out memory-conscious personal computers from its LAN Manager-based OS/2 LAN Server package.

Workstations on a token ring that access IBM mainframes do not do so using APPC. Most simply run in emulation of 3270 terminals such as IBM's Distributed Function Terminal, its Control Unit Terminal or cluster controllers. This emulation requires only minimal SNA protocol processing over the net's 802.2 LLC.

Where 3270-oriented programs are run on personal computers, for example, the application programs use either the IBM-developed Entry-Level Language Application Program Interface (API) or High-Level Language API.

A multitude of LAN network operating system software vendors offer products that give personal computers and other systems access to IBM hosts over a token ring. These have been specifically excluded from this product comparison because microcomputer-to-mainframe packages will be assessed in their own Buyer's Guide.

Many protocols

In addition to multiprotocol support on an alternating basis, users may also need to run different protocol environments over their token ring between the same LAN-attached nodes at the same time. Two widely supported adapter driver standards provide this capability:

■ **The Adapter Support Interface (ASI).** Also known as the IBM LAN Support Program, the ASI is the most commonly implemented DOS personal computer adapter interface convention. It specifies the critical link that connects the token-ring adapter with the DOS network operating system software.

■ **The Network Driver Interface Specification (NDIS).** While Microsoft Corp.'s NDIS is most commonly supported on OS/2- and LAN Manager-based systems, it can also be deployed on DOS-based personal computers. NDIS is now supported on OS/2- and LAN Manager-based token-ring server software packages from 3Com, AT&T, FTP Software, Inc., Hewlett-Packard Co. and others.

ASI or NDIS

According to Bruce Campbell, director of marketing at FTP Software, ASI provides a straightforward way for a DOS node to operate simultaneously in multiprotocol environments over the same token-ring adapter.

The multiprotocol traffic is separated at the interface and forwarded to the appropriate network operating software based on the source and destination service access point addresses within each packet.

However, Campbell says the NDIS procedures for separating and routing packets of different protocols between the adapter and operating software are not as simple.

Unlike ASI, NDIS is largely transparent to the actual LAN technology, be it token ring, Ethernet or something else.

ASI, embodied in IBM's LAN Support Program, was written by IBM to standardize DOS-based personal computer connectivity — specifically to a token ring — and still serves as the standard in that LAN environment.

Users planning to run NetWare over token-ring LANs should note that Novell has a program for certifying the compatibility of third-party adapters and adapter drivers with NetWare software. But since Novell charges a fee for this certification process, very few adapter vendors that offer token-ring adapters with NetWare drivers have participated.

Only one token-ring adapter vendor, Olicom, has obtained official Novell compatibility certification so far. Notwithstanding, many vendors of token-ring adapters offer drivers specifically for Novell operation and compatibility.

Packages that handle a host of different operational needs, protocol and interface support, and connectivity options are available.

Users should note that while achieving connectivity is a primary concern, the performance of different vendors' packages will vary significantly, as will their capability for LAN management.

Because of these factors, users should deeply scrutinize potential vendors' offerings before making a purchase decision.

Letters

continued from page 33

and no call blocking. Our operators brand all calls, and a recorded announcement further identifies Mid-Atlantic Telecom on all operator-assisted calls. Even the most notorious AOS firms are at the mercy of greedy premises owners that want to allow calls to be placed only through their carrier of choice.

Mid-Atlantic Telecom serves more than 10 private pay telephones within one block of the Federal Communications Commission offices in Washington, D.C., and the owner of the phones has declined to provide the required signs for over a year.

The competitive regional long-distance provider has been responsible for every service enhancement, price reduction and technological improvement offered to the telecommunications consumer since deregulation. Wagenhauser's firm, the Telecommunications Research and Action Center, seems to champion the cause of AT&T — which for decades offered consumers intimidation, inferior network quality and monopoly pricing — along with MCI and US Sprint, which in many cases, are no better than the AOS firms they want to shut down.

Donald Burns
Vice president of customer care
Mid-Atlantic Telecom, Inc.
Washington, D.C.

AOS answers

I found David Wagenhauser's "Alligators in the Swamp" article regarding the current alternative operator services (AOS) environment informative ("Invasion of the phone snatchers," *NW,* June 11).

While it may be true that AOS companies "lurk at pay phones, airports, hotel and motel rooms," and so on, it is equally true that the agents responsible for decisions regarding the primary carrier assigned to these phones are active partners with the AOS company. These agents are the user companies (a store, hotel owner or hospital administrator) on whose premises the phones are located.

In addition to the AOS company, the user company stands to profit from most 0+/0- traffic originating from these phones. And it is the agent who compared commission plans and service offerings from the various AOS vendors and made a decision as to which AOS provider would get the business.

Before turning to the Federal Communications Commission, consumers who have been stung by AOS providers should complain to the agent.

The agents are in a position to make swift and effective decisions regarding the carrier with whom they do business. And most agents are sensitive enough to their users' concerns that several similar complaints will result in a review of their decision to do business with an AOS company.

Dennis O'Brien
Hospitality industry specialist
US Sprint Communications Co.
Woburn, Mass.

Author's reply:

I wholeheartedly agree with Dennis O'Brien's assertion that agents (premises owners) are "active partners" with alternative operator services companies and should be informed of all complaints. Unfortunately, since the consumer may receive the bill months after the call was made, it may be difficult to remember or locate (in the case of a street-corner pay phone) the proper authority.

My suggestion that concerned consumers contact the operator provider or the Federal Communications Commission was made to inform users that refunds (to the rate of the caller's preferred carrier) are obtainable. And contrary to Donald Burns' statement, I in no way meant to infer that regional carriers, as an industry, are alligators. In fact, the word regional, or reseller, was not mentioned in the article. Many regionals offer competitive rates and innovative services.

I mentioned AT&T, MCI Communications Corp. and US Sprint Communications Co. in the article for a number of reasons: They are familiar to readers and consumers, they command more than 90% of the market, and they, unlike most resellers, file tariffs at the FCC, enabling rate scrutiny.

Burns' attempt to blame "greedy premises owners" for insufficient consumer notification requirements, however, doesn't quite ring true. The FCC stated in its 1989 order that operator providers "bear primary responsibility" for the notification being on the phones. Whether the operator provider amends its contracts with owners, as the FCC has required, or uses the leverage it has through whatever commission incentive it may offer, something can and should be done to ensure consumer notification.

Lastly, I find curious Burns' assertion that the Telecommunications Research and Action Center "champions" the cause of AT&T, MCI and US Sprint. Neither in the article nor in our program do we champion any cause but that of the consumer. In fact, we frequently and vociferously (publicly and privately) voice our concerns and disagreements with AT&T, MCI and US Sprint, as well as other companies.

As a consumer group, TRAC's aim is to try to ensure that in the dog-eat-dog telecommunications environment, it is not the consumer who gets bitten.

David Wagenhauser
Executive director
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Washington, D.C.

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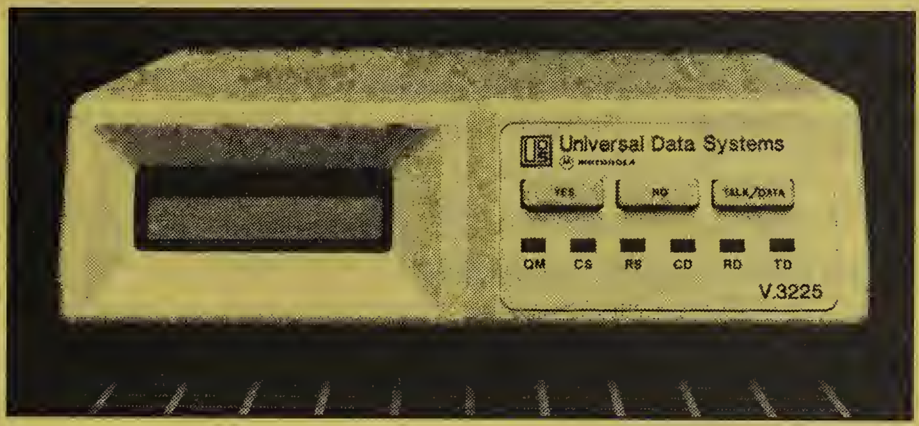

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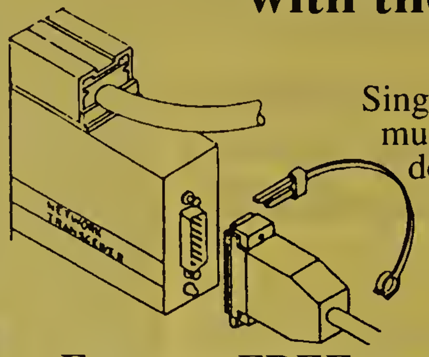

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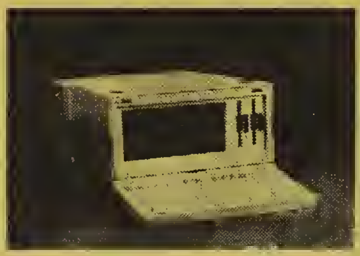

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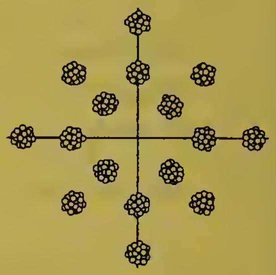

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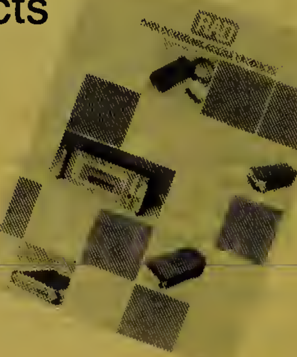

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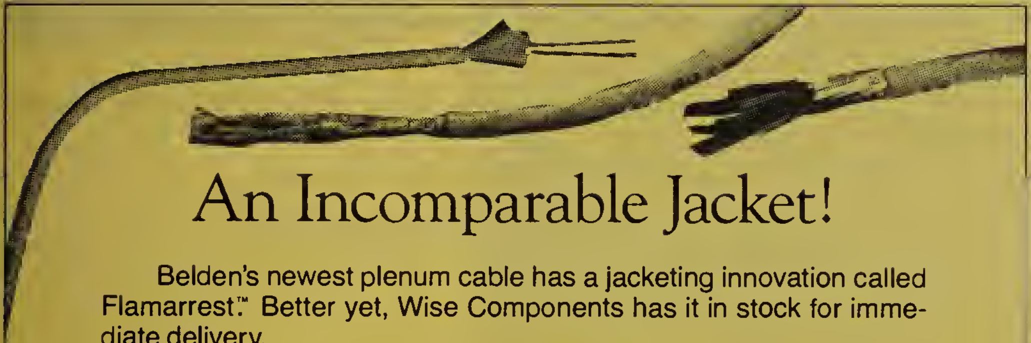

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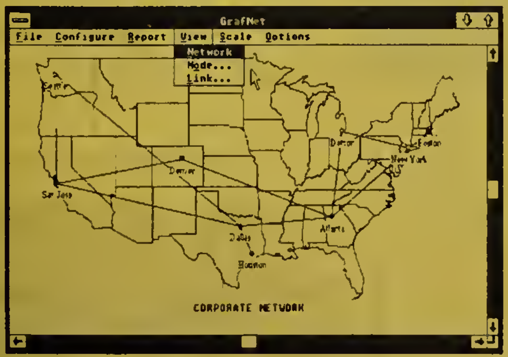

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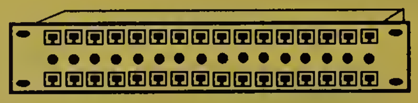

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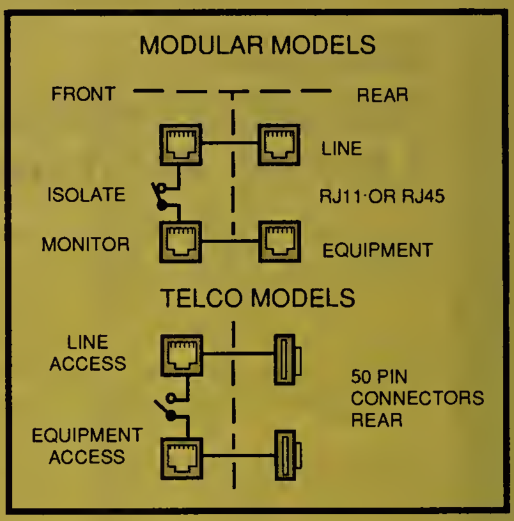

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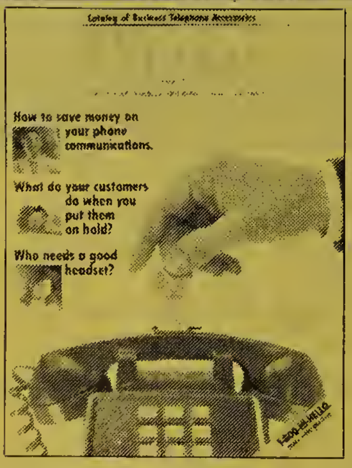

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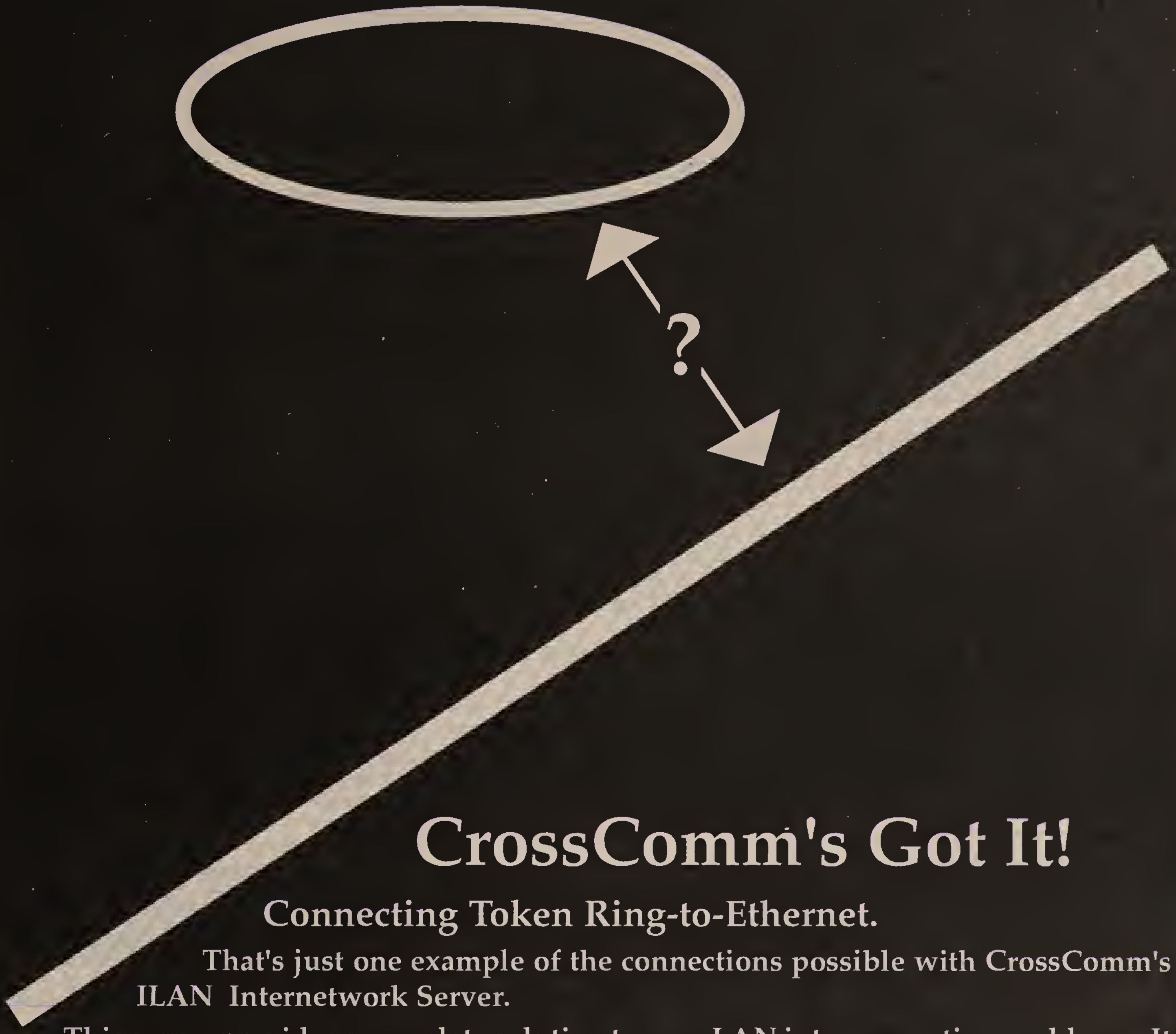

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Bonus Distribution: NetWorld Dallas

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Comparison of Carrier Customer Service Organizations

September 24
Network World 5th Annual Budget Survey *Bonus Distribution: TCA*

Coming to the outsourcing conclusion

American Standard, Inc. was one of the first companies ever to outsource all of its data processing and network operations. According to Gary Biddle, vice-president of information and systems technology for the worldwide maker of plumbing, air conditioning and automotive products, making the decision to outsource wasn't easy.

During 1987, Biddle evaluated five options for information systems (IS) and network operations after a decision by the firm's new chief executive officer to downsize the corporate bureaucracy and shift decision-making to business units.

The first option was to retain the four major data centers serving scattered business units. But that approach would have led to hefty expenditures to consolidate operations or purchase new mainframes for existing centers.

A second option was to spin off IS as a profit center, selling processing capacity to other users. Unfortunately, many users in the New York metropolitan area, where American Standard is based, had already taken that tack.

Next, Biddle considered disbanding corporate IS and letting business units establish their own data centers. This would require a huge capital outlay, and few business units wanted the responsibility of managing a data center.

Another option was to hire a vendor to manage data center and network operations. The firm would retain ownership of the facilities and would purchase services from the vendor. But the vendors that American Standard contacted said the firm was running its operations as efficiently as possible, and they weren't interested.

Finally, Biddle said he realized the most cost-effective approach was to shut down the firm's facilities and transfer all operations to a vendor that would run them from its own facilities.

In 1988, the firm shut down its data centers, eliminated most of its IS positions and signed five-year contracts with Genix and McDonnell Douglas Network Systems Co. to manage DP and network operations.

Biddle said outsourcing has reduced IS and network costs by 15% to 30%

— *Wayne Eckerson*

HP systems act as Mac servers

continued from page 2

nals to access the HP and Apollo servers. This lets Macintosh users exchange electronic mail with DOS, OS/2 and Unix workstation users within HP's NewWave environment, Campbell said.

PacerShare, an implementation of Apple's AppleShare file server software, enables HP and Apollo computers to act as large file servers for Macintoshes. Users can integrate their Macintosh and Unix files, applications and data base information using PacerShare.

PacerPrint lets HP and Macintosh users share HP LaserJet III, IID and IIP laser printers, as well as Apple LaserWriter printers, thereby minimizing hardware investments.

Campbell said there is large pent-up demand within HP's user base for Macintosh file and print sharing. "This can end up saving users a lot of money because it minimizes the number of printers they have to buy. Prior to this, HP users would have had to purchase separate printers for their Macintosh users because Macintoshes generally print to PostScript printers," he noted.

Porting the Pacer software to HP and Apollo systems will also enable users to build larger networks requiring fewer file servers. A single HP or Apollo server supports as many as 200 Macintoshes in a work group network in contrast to a group of just 10 to 15 users linked via a Macintosh AppleShare server, Campbell said.

Macintoshes will connect to the HP Ethernets via Apple's 10M bit/sec EtherTalk adapters. Macintosh users can also bridge their 230K bit/sec LocalTalk nets to an HP Ethernet.

> Campbell said there is large pent-up demand for Macintosh file and print sharing.
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The PacerLink and PacerShare software ranges from $1,200 for a five-user license to $15,000 for an unlimited-user license. PacerPrint software starts at $2,000 for a five-user license, and the license for an unlimited number of users costs $4,000.

The PacerLink software is available now, while the PacerShare and PacerPrint packages will ship in September.

Outsourcing: tough call for execs

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tract with MCI Communications Corp. to run the brokerage firm's voice and data network.

According to Thomas Byrnes, vice-president and group manager at Merrill Lynch, the firm would not have considered outsourcing a few years ago because carriers were not capable of handling such an arrangement.

"In the early 1980s, [Merrill Lynch] felt it had to build its own networks because we didn't trust carriers," Byrnes said. "Now the vendors are stepping up to the plate and contractually obligating themselves to provide reliable, cost-efficient service."

Today, outsourcing is essentially a "make or buy" decision that is primarily cost-driven, Byrnes said. "We looked at everything in our operations. When it was more cost-effective for a vendor to provide the service, we outsourced," he said.

But many users remain reluctant to farm out operations.

Charlie Snell, director of computing and communications services at Harris Corp., said he does not trust carriers to manage a complex data network. Snell, who is in the midst of an outsourcing evaluation, said he would consider outsourcing data center operations but not the network.

"Companies that outsource their network suffer a lot of heartache," Snell said. "Their outages don't diminish."

Because data networks often support multiple traffic types, such as Synchronous Data Link Control, X.25 and asynchronous traffic, they are difficult to manage, Snell said. In contrast, data center management has matured to the point where it's relatively simple to transfer.

A network manager at a Fortune 500 firm who requested anonymity said, "If vendors could provide reliable, value-added service, then I and my [network] organization wouldn't be necessary. [Outsourcing vendors] are so much bloody smoke. They say they can do anything, but they lack skills in the worst way."

The manager said companies that consider outsourcing should carefully weigh the risks.

"If you are a $20 billion company, are you willing to let a $1 billion outsource firm manage your network?" he asked. "If your company loses a competitive advantage because of a network outage, you can't fire the president of the outsource company and you probably can't recoup your losses in a lawsuit."

For many users considering outsourcing, a primary issue is whether to turn over strategic systems.

The Yankee Group, a Boston-based market research firm, defines outsourcing as a continuum that covers a range of network and IS applications. Applications at one end of the continuum have low strategic value and may be considered commodity applications. These include data center operations, basic network transport, and net management and personal computer support.

At the other end of the spectrum are applications with greater strategic value. These include application development, network design and strategic planning.

> "We looked at everything in our operations. When it was more cost-effective for a vendor to provide the service, we outsourced," Merrill Lynch's Byrnes said.
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The Yankee Group said it believes that many companies will initially only outsource commodity functions, but in the next several years, more companies will turn to vendors to handle strategic applications.

"Users will gradually gain confidence that [outsource] vendors can manage or build strategic applications, especially if [vendors] are already on site managing routine functions," said Howard Anderson, managing director of The Yankee Group.

The Yankee Group is sponsoring a seminar on outsourcing July 31 to Aug. 1 in Atlantic City, N.J.

While many network and IS managers interviewed by *Network World* agreed with The Yankee Group's assessment, some companies are already outsourcing nets that have a high strategic value to their company.

Chevron Corp., for example, recently outsourced to Hughes Network Systems, Inc. its retail point-of-sale network that serves more than 2,000 Chevron service stations and other retail outlets. At the same time, it handed over to AT&T its private voice network and its IBM Systems Network Architecture data net, which supports more than 500 sites in the U.S. and Europe.

According to Tom Mulgrew, manager of network design, Chevron is outsourcing the POS network precisely because it is an extremely critical component of the company's retail operations.

"We think Hughes can build and operate a POS network that provides more reliable service and better response time than our current network. Outsourcing will give us a competitive advantage," Mulgrew said.

But other companies are extremely reluctant to let vendors build or manage networks that support strategic operations.

The Gannett Co., Inc., for example, intends to maintain complete control over the satellite and leased-line terrestrial network that supports *USA Today,* its national daily newspaper.

According to Bill Hider, vice-president of telecommunications at Gannett, the *USA Today* network is so complex and vital to the operations of the paper that it would be impossible to have a vendor manage any piece of it.

"I don't want to put a vendor in there who has other priorities and whose resources can be diluted without my knowledge. We need to be in control," he said.

But Hider is not adverse to outsourcing in less strategic ar-

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DEC exec shares plans for '90s

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NetWare LANs. [These applications include] X.400 mail messaging, the ability for NetWare users to make SQL calls to access VAX-based relational data bases and even to be able to get out through VAX-based gateways to access data bases residing on IBM mainframes in their corporations.

We're trying to figure out the right approach to bring NAS and net services to Novell NetWare users in our account base.

Have you had any discussions with Novell about this?

We have a good working relationship with Novell, and its roots go back to over a year ago, when we signed the service agreement.

Will DEC offer direct support for NetWare on DECnet LANs the way it does with LAN Manager?

I think it's reasonable to expect that we will be providing NAS capability to our NetWare users. And the other thing that goes along with that is support for token-ring LANs. We have many users that want DEC to provide integration of those LANs into the DEC environment via token-ring adapters, bridges and gateways and bring the NAS services to the intelligent desktops.

However, Ethernet is still our primary strategy, and we will offer Ethernet and 100M bit/sec FDDI support on a variety of media types, including thin and thick wire and 10BaseT.

Groups protest FCC plan to change bundling rules

Firms claim FCC proposal gives AT&T unfair edge.

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — Equipment manufacturers, long-distance carriers and industry trade groups last week banded together to voice their disapproval of an FCC proposal to fundamentally change its rules on equipment bundling and relax AT&T's network disclosure requirements.

In comments filed with the Federal Communications Commission, manufacturers of customer premises equipment predicted that they would be squeezed out of business or forced into mergers with carriers if AT&T is allowed to bundle equipment and services on a nonregulated basis.

In March, the FCC proposed a sweeping set of rule changes that would give AT&T virtually unlimited freedom to offer nontariffed custom network deals and would significantly reduce the regulatory oversight of almost all its other business services ("FCC moves to relax regulation of AT&T," *NW,* March 12).

That proposal would enable AT&T and possibly other carriers to discount customer premises equipment or offer it free when bundled with transmission services.

"Not even the most zealous deregulators ever suggested that the commission abandon its commitment to treat CPE as 'separate and distinct from the provision of common carrier services,' " according to the Independent Data Communications Manufacturers Association, Inc., which represents equipment makers. "If this proposal were adopted, the independent CPE market would be destroyed and the ultimate loser would be the consumer."

Adapso, the computer services and software industry association, the Competitive Telecommunications Association, Digital Equipment Corp., IBM and MCI Communications Corp. labeled the FCC's proposal both illegal and competitively harmful.

Opponents argue that bundling violates provisions of the Communications Act of 1934, which prohibits discrimination in provision of services and requires that rates are just and reasonable.

> "If this proposal were adopted, the ultimate loser would be the consumer."

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Bundling may constitute an unlawful rebate, DEC stated in its filing. "If discounted services are made available to customers who purchase equipment from the carrier but not to customers who purchase equipment elsewhere, serious discrimination questions would appear to be raised," DEC said. The vendor alleged that bundling would give AT&T the chance to buy market share.

AT&T is the only long-haul carrier that manufactures telecommunications equipment.

AT&T could offer steep discounts on equipment and service packages, said DEC, thereby preventing other customer premises equipment manufacturers from competing on price. DEC added that AT&T could make up any losses it suffered by inflicting stiff licensing fees on companies using AT&T's technology.

The North American Telecommunications Association (NATA), representing 700 manufacturers and suppliers of customer premises equipment, told the FCC that a bundling policy would push firms offering the equipment to strike partnerships or merge with long-distance providers. NATA believes the long-term effect would create an oligopoly in which a handful of firms would dictate market prices and offer fewer innovations than today.

The FCC maintains that bundling would "allow AT&T to compete more vigorously in the long-haul market by creating attractive service/equipment packages for customers. This, in turn, could spur other interexchange carriers to develop innovative packages as well." The FCC contends that the ultimate beneficiary will be the consumer.

But the International Communications Association (ICA), a trade organization of telecommunications users, disagreed.

In its comments, ICA said that during its annual conference, "no ICA member, large or small, involved in public policy issues or not, thought that the elimination of these rules was a good idea. This proposal creates significant long-term uncertainties and other risks, but confers what may be, at best, short-term gains."

Dismissing industry concerns about bundling and the network disclosure rules, AT&T said, "The intense competition that exists in the interexchange market is a complete answer" to any questions about possible cross-subsidization and discrimination.

Nynex offers ISDN rollout plan

continued from page 2

tiline hunting, modem pooling and digital electronic telephone service, which provides users with key telephone system-type features such as call bridging, from the central office.

"We're going to present [BRI] features using a menu approach that will allow customers to choose the capabilities they want," Nynex's Ray explained. "We won't force packages on them."

Mary Cooke, associate director with Nynex, said BRI service will initially be limited to areas served by a particular ISDN-ready switch. However, she added that these islands of ISDN service in Boston and New York will be linked in 1991.

Donald Lane, ISDN director for Nynex, said the BRI filing is in response to substantial demand for ISDN services. "Introducing a tariff now will give New England and New York customers a chance to use and test ISDN services within selected local exchange areas," he said.

BRI specifies how a single telephone line can support two 64K bit/sec B channels for voice and data communications and one 16K bit/sec D channel for signaling data and packet-switched data communications.

Kenneth Phillips, chairman of the 30-company Committee of Corporate Telecommunications Users (CCTU) and vice-president of Citicorp's Office of Telecommunications Policy, said BRI service would be of limited use to large users.

"I don't think you'll see companies like Citicorp pumping all their traffic over BRI links to the central office," he said.

But he added that CCTU members, many of which currently use T-1 and T-3 links, would welcome the introduction of ISDN PRI service early next year.

The service incompatibilities caused by Nynex' use of alternate mark inversion (AMI), a line coding scheme, may limit the use of the ISDN BRI offering. AT&T and Northern Telecom have implemented different versions of AMI on their central office switches.

As a result, companies with Northern Telecom station equipment can use BRI service provided by the vendor's DMS-100 switch but cannot use ISDN service from an AT&T 5ESS switch without protocol converters.

Nynex plans to remedy the problem beginning next year by equipping the 25 central office switches to support 2B1Q, an emerging CCITT standard for line coding, Ray said.

What the market will bear

Nynex said the B.I.S. Mackintosh study showed that users were interested in a range of BRI service options and outlined what customers were willing to pay for those options. Options and desired pricing included:

- Circuit-switched voice over a single 64K bit/sec B channel at $18 per month, with an additional $3.70 per-month charge to use the second B channel for voice.
- Packet-switched data service at 9.6K bit/sec over the D channel at $22 a month, with an additional $4.40 monthly charge for the same capability on a B channel.
- Packet-switched data at 64K bit/sec over one B channel for $330 a month, with an additional $105 monthly charge for the same capability on the other B channel.
- Circuit-switched data at 64K bit/sec over one B channel for $38 per month and an additional $6.90 a month for the same capability provided on the D channel.

FCC plan stirs debate

continued from page 1

AT&T to offer service via contracts or on a private non-common carrier basis. It also suggested eliminating rules that prevent AT&T from bundling equipment with services (see "Groups protest FCC plan to change bundling rules," this page).

In comments filed last week, the International Communications Association (ICA) was enthusiastic about only one of the FCC's proposals — allowing AT&T to roll out business services on shorter notice — and opposed aspects of the commission's other suggestions.

ICA said there are too many legal uncertainties about how the FCC could allow AT&T to offer services on a private non-common carrier basis and, consequently, opposed that option.

The group was more enthusiastic about the prospect of AT&T offering custom networks under individual contracts but pointed out flaws in that proposal. Many members of the group already subscribe to service under AT&T's Tariff 12, which allows them to purchase tariffed custom networks without revealing the contents of accompanying contracts to the FCC.

ICA, whose combined membership spends at least $1 million annually on communications, said users would be unwilling to forgo the tariff process and purchase services through contracts if it entailed filing the contracts with the FCC for review.

Large corporations fear that competitors might be able to deduce business strategy, locations of major operations and potential mergers, acquisitions or affiliate relations by getting network configuration information from the FCC, according to ICA.

The Tele-Communications Association, Inc. (TCA), which represents user companies of various sizes, said it opposes all of the FCC proposals. The group said the FCC incorrectly calculated the level of competition in the industry and, therefore, proposed giving AT&T too much flexibility.

Proceeding with its three proposed rule changes for business services would be tantamount to the FCC voluntarily surrendering its authority to prevent AT&T from cross-subsidizing competitive services, discriminating among users or allowing service quality to decline, the group said.

"Consumers do not have enough bargaining power to justify the elimination of regulatory oversight," TCA said.

If the market were fully competitive and carriers were interchangeable, it would be simple to switch carriers, the group added. But, in reality, it takes a significant outlay of time and money.

Representing the other extreme of comments filed last week, the Ad Hoc Telecommunications Users Group said it believes the business services market is fully competitive and that it is time for regulators to step aside. The group supported all of the FCC's proposals for AT&T's transmission services.

The Ad Hoc Group is particularly eager to see tariff delays reduced. The group said customers have lost millions of dollars because they have been forced to wait as long as four months for the FCC to clear AT&T offerings. The group's main concern with the FCC proposals is that the mechanics of obtaining network services via contracts or private arrangements have not been fully defined.

According to comments filed by carriers last week, AT&T's rivals share some of the same concerns as users. MCI Communications Corp. said it could support streamlining tariff filings for AT&T's business services, but only if the FCC requires 14 days' notice instead of only one.

However, MCI was adamantly opposed to the FCC's contract and private non-common carrier proposals, labeling them as radical changes. "These proposals would provide AT&T a free hand to engage in precisely the sort of discrimination that the Communications Act was designed to prevent," the carrier said.

US Sprint Communications Co. told the FCC it wrongly concluded that AT&T is no longer dominant and is being too hasty in loosening regulation.

"The commission confuses the scratching and clawing for customers by US Sprint and others with fair and open competition," the carrier said.

The two carriers also claimed that giving AT&T the ability to offer services on a contract or private basis "would give AT&T a license to discriminate at will."

IDC offers ISDN index

continued from page 1

today, meaning that a little more than a third of the total ISDN infrastructure is already in place. IDC estimates that ISDN will reach a critical mass when the index hits 70%. At that point, ISDN-capable services will be available to a majority of commercial customers.

The index measures the availability of ISDN-related services and equipment from more than 50 vendors in four markets:

- **Long distance.** The index tracks AT&T, MCI Communications Corp., US Sprint Communications Co. and other common carriers, examining Primary Rate Interface (PRI) availability, percentage of carrier points of presence where PRI is available, Signaling System 7 (SS7) deployment and availability of pre-ISDN services.
- **Local exchange.** The index tracks the seven regional Bell holding companies and independents such as GTE Corp. and United Telecommunications, Inc., examining Basic Rate Interface (BRI) and PRI support, SS7 deployment and SS7 links to long-distance carriers.
- **Customer premises equipment.** The index tracks AT&T, Northern Telecom, Inc., Rolm Co. and others, examining the number of BRIs and PRIs shipped.
- **Private branch exchange-to-computer links.** The index tracks Digital Equipment Corp., Hewlett-Packard Co., IBM and several terminal adapter manufacturers, examining the availability of software products and application development tools for linking computers to ISDN switches.

IDC has weighted each market segment in terms of its importance to the usefulness of ISDN.

Long-haul carriers

	Today's index	Maximum index
Primary Rate Interface	5%	8%
Points of presence equipped for PRIs	2%	3%
Signaling System 7 deployment	8%	11%
Pre-ISDN services	2%	3%
Total	17%	25%

Local exchange carriers

	Today's index	Maximum index
Basic Rate Interface	2%	14%
Primary Rate Interface	0%	5%
Signaling System 7 local deployment	0%	11%
SS7 links to long-haul carriers	0%	5%
Total	2%	35%

Customer premises equipment

	Today's index	Maximum index
Basic Rate Interface lines	3%	11%
Primary Rate Interface lines	10%	14%
Total	13%	25%

PBX-to-computer links

	Today's index	Maximum index
Digital Equipment Corp.	1%	4%
IBM	2%	7%
Hewlett-Packard Co.	1%	3%
Other	0%	1%
Total	4%	15%

Long-haul carrier participation in ISDN is weighted at 25% of the critical mass index; local exchange carriers at 35%; customer premises equipment at 25%; and PBX-to-computer links at 15%.

Theoretically, when ISDN services are universally available, IDC's ISDN-CMI would be 100%. That point will never be reached, however, because ISDN is an evolving standard and new technologies are constantly being introduced. But IDC expects ISDN's critical mass will be achieved sometime around 1995.

Today, 36% of the necessary infrastructure is in place, with long-haul carriers contributing 17%, the local exchange carriers 2%, customer premises equipment vendors 13% and the vendors of PBX-to-computer links contributing 4%.

The interexchange sector is furthest along with ISDN deployment, having already installed nearly 70% of the infrastructure required to make ISDN useful — a number derived by dividing the percentage of infrastructure in place by the maximum percentage possible.

The local exchange carriers have been less productive, installing less than 6% of the infrastructure the industry requires.

Vendors of customer premises equipment seem to be upholding their end of the bargain, offering ISDN support on 50% of the products tracked by the index.

The last sector in the index, the PBX-to-computer link area, is another industry segment where ISDN development is dragging. Less than 27% of the products needed are available today.

The chart on page 1 shows the projected change of the ISDN-CMI index and rate of ISDN absorption into the marketplace. However, while we will not reach a critical mass of ISDN until the mid-1990s, developments such as electronic mail and facsimile have shown that new communications technologies can be useful at many stages of deployment.

For example, people often call other users to ask them for their fax number. We may follow the same procedure for ISDN BRI connections, asking, "Does your workstation have BRI?" and "What is your network address?"

In such an environment, the best way to measure the usefulness of ISDN is by gauging the supporting infrastructure needed to support end-to-end intelligent network links — the goal of IDC's ISDN-CMI.

Donovan is a senior research analyst in International Data Corp.'s Intelligent Networks Service program.

Users, Bells stand behind FCC

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puter Services Co., Electronic Data Systems Corp., Ford Motor Co., General Electric Co., Honeywell, Inc., Monsanto Co., J.C. Penney Co., Inc. and Procter & Gamble Co.

In its arguments filed last week, AT&T defended Tariff 12 on technical grounds, saying packages under the tariff eliminate some engineering functions that would otherwise be necessary if customers ordered services in separate parts.

Dismissing the argument that Tariff 12 deals are discriminatory, AT&T noted that some of its Tariff 12 packages now have multiple customers.

RBHC support

Ameritech, US West, Inc. and Southwestern Bell Corp. also voiced support of Tariff 12, but their main concern was how the court's decision would affect their own operations.

The regional Bell holding companies said that if the court rules against Tariff 12, it would only have "an unpleasant but transitory impact on AT&T" because of the FCC's proposed rulemaking to deregulate AT&T. But they also said it would severely affect their operations by indefinitely limiting their flexibility in pricing and service offerings.

The three RBHCs, like AT&T, are classified by the FCC as dominant carriers and must file general tariffs. They are now prohibited from making customer-specific offers. If the court upholds Tariff 12, the RBHCs would have a better chance of convincing the FCC to let them offer discounted service packages.

AT&T leapfrogs with EasyLink

continued from page 1

that it was engaged in discussions regarding the possible sale of the unit as part of its effort to raise cash to pay off debts.

If approved, the acquisition of EasyLink would make AT&T the leader in the electronic messaging market, increasing its U.S. market share from less than 10% to about 40%, according to David Atlas, senior analyst for electronic messaging at International Data Corp., a Framingham, Mass.-based market research firm. AT&T made a late entry into the market in 1986 with the introduction of AT&T Mail. EasyLink was first offered in 1982.

Most mailboxes

The combined AT&T Mail and EasyLink market share would be about twice as large as the next closest competitor, US Sprint Communications Co.'s SprintMail messaging service, Atlas said. The acquisition would also give AT&T the greatest number of electronic mailboxes, approximately 300,000, he added.

According to Steven Sieck, vice-president of electronic services at Link Resources Corp., a New York market research firm, "This is a relatively inexpensive way for AT&T to build overnight commanding market share in the domestic E-mail market."

The acquisition will also give AT&T a stronger platform on which to provide information services, a market that AT&T was allowed to enter last year, he said.

AT&T plans to merge EasyLink with its AT&T Mail service, though no timetable for integration has been determined yet, according to an AT&T spokesman. Until then, the EasyLink network will operate independently of AT&T Mail, although AT&T and Western Union earlier this year announced an agreement linking their public E-mail services via an X.400 gateway.

The acquisition of the Business Services Group would be AT&T's second big buyout in the messaging field within a year. Last fall, AT&T announced it would buy London-based value-added network operator Istel, Ltd. for $280 million ("AT&T targets Europe with Istel buyout," *NW,* Oct. 2, 1989).

The purchase of EasyLink is expected to give AT&T a bigger boost domestically than overseas, although the Telex business should help AT&T abroad, where Telex is still popular. AT&T will attempt to migrate customers from Telex to its E-mail offerings, a company spokesman said.

AT&T has also bolstered its position in the messaging market during the past year with the introduction of AT&T Voice Mail and Enhanced Fax services.

John Smart, AT&T's president for Business Communications Services, said the EasyLink acquisition "is another sign of our commitment to customers' global messaging needs."

Seth Blumenfeld, president of MCI International, Inc., said he expects the acquisition will make AT&T "a tougher global messaging competitor," adding that MCI welcomes the challenge. MCI offers the MCI Mail electronic messaging service.

John Sherburne, director of product planning at US Sprint, said the acquisition simply shifts market share from one carrier to another.

"It bears out what we have been stating for quite a while — that there will be a shakeout in the market so that the major competitors will be just what they are in the telephone market," he said. "But the market shares in messaging will be different from those in the voice market."

Walter Ulrich, managing director for Arthur D. Little, Inc.'s Pacific Southwest region, said the agreement "takes AT&T's electronic messaging product from being one of many to being one of the premier products.

MCI said the acquisition will make AT&T "a tougher global messaging competitor."

▲▲▲

"AT&T wouldn't acquire this business if it didn't have a strong belief that electronic mail will be a vital business in the '90s," he said. "This really underscores AT&T's commitment here."

The agreement is welcome news for existing EasyLink users, many of which have been concerned about Western Union's financial health, Ulrich said.

Jeff Littrell, manager of local-area network E-mail integration at Hughes Aircraft Co. in Long Beach, Calif., agreed. Hughes uses both EasyLink and MCI Mail.

"It didn't come as any surprise to us that EasyLink was bought up by a company with a more stable financial situation than Western Union," Littrell said. "If anything, the move should be positive." Western Union has been selling off a number of its assets to pay off debts and avoid filing for bankruptcy.

In selling off its Business Services Group, Western Union will complete the transformation from being a telecommunications company to being a provider of value-added services focused on its traditional financial services and paper-based messaging businesses, according to Robert Amman, Western Union's president and chief executive officer.

Zytron builds remote links

continued from page 2

tron location is attached to a controller supporting multiple IBM 3480 tape drives, which record bulk data files transmitted from NCNB. Completed tapes are then fed into a computer output microfilm (COM) machine that produces microfiche copies of daily banking transaction records and account balances for long-term storage.

Other Zytron customers prepare their own tapes and ship them by courier to Zytron. The channel network will "allow us to eliminate the courier and reduce the turnaround time for finishing jobs," said William Pfeiffer, a Zytron vice-president.

Channelink's network features made channel extension technology practical for Zytron, Pfeiffer said. Use of point-to-point extenders would have been cost-prohibitive because Zytron would have had to install multiple extenders, one for each customer. Likewise, customers would have needed a separate extender for each Zytron site they needed to access.

"CNT's channel extension technology gives us the ability to drop data from multiple customers to a single extender at one of our centers, create tapes and still run in a batch kind of mode," Pfeiffer said. "Our strategic network will be based on CNT. But it's probably going to take us a few months to get that implemented."

Channelinks at customer locations will work in conjunction with Zytron-developed software running on an IBM host that compresses data before it is transmitted to the Channelink at 24M bit/sec over traditional bus and tag cable.

As data is sent from the host to the Channelink, it is encapsulated in packets containing a subchannel address that the extenders read to determine which wide-area link to use. The Channelinks at Zytron's sites read the subchannel address on incoming data and route it to the appropriate tape drive. Each Zytron Channelink can support as many as four IBM tape drive controllers, and each controller can support up to eight tape drives.

When creating microfiche, Zytron's staff loads completed tapes onto a customized COM machine developed by Zytron. That machine, based on hardware supplied by DatagraphX, Inc., recreates the original data stream as the data is read from the tape. The data is used to produce 4- by 6-in. microfiche cards, each of which contains the equivalent of 269 computer printout pages.

Pfeiffer said Zytron will soon attach Xerox Corp. laser printers to the Channelink at its sites, making it possible for customers to use channel extension technology to route print jobs to Zytron locations. Currently, customers submit print jobs by shipping in tapes via courier services.

Pfeiffer said the network will enable Zytron to dedicate specific tape drives or printers to certain customers. Alternatively, the firm will enable customers to share tape drives or printers by the time of day.

"The value of the network and this concept is that it now allows us to get bulk data files in a compressed state from a channel to a remote location quickly and at a low cost," Pfeiffer said.

To keep transmission costs down, Zytron allows NCNB to transmit bulk data files to Zytron over NCNB's private net at night, when its backbone T-1 circuits are underutilized. Zytron needs only to lease a T-1 line from its locations to the nearest central office through which NCNB's backbone T-1 circuits pass.

Pfeiffer said Zytron hopes to do this with other customers as well. "In most cases, we'll work with the customer's net," he said. "Eventually, we'll have our own network for customers that aren't large enough or don't have their own network facilities passing near our locations."

New VAX can be LAN server, mini

continued from page 4

4000 to a sister unit or VAX 3000; the two processors can share as many as 12 disk drives; and both processors can have access to the data. DEC is positioning its dual-host VAX 4000 Model 300 configuration as a lower cost alternative to fault-tolerant systems, which provide higher levels of availability.

The VAX 4000 Model 300 can also be positioned as a time-sharing or multiuser system.

Lastly, the VAX 4000 Model 300 can be used for real-time applications, polling different devices for data, such as in a pipeline monitoring application.

Pricing

The system is available now. A VAXserver 4000 Model 300 costs $75,410, and a VAX 4000 Model 300 DualHost Server costs $135,730. A VAX 4000 Model 300 VMS Timesharing System is priced at $106,850, and a VAX 4000 Model 300 Dual-Host Timesharing System costs $233,230. Pricing includes software, a VMS license, 32M bytes of system memory, 381M bytes of hard disk storage and 296M bytes of tape storage.

The rtVAX 4000 Model 300 Realtime System costs $56,970, a figure that does not include disk or tape storage but does include VAXELN software, a scaled-down version of VMS for real-time processing.

Outsourcing: a tough call

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eas, especially if he cannot find enough skilled people to perform the job. Hider recently hired an outside vendor to service and maintain much of the company's communications equipment, something that his staff had done for the past nine years.

Just the network

Besides weighing the costs or the strategic value of applications, the decision to outsource is sometimes determined by a company's business direction, its systems and network architecture, or corporate politics.

Last year, under pressure from a leveraged buyout, The Kendall Co. outsourced the management of its newly built AS/400 network to IBM.

The health care products firm had recently converted from a centralized IS architecture based on an aging mainframe to a distributed processing environment supported by AS/400 minicomputers at about 20 Kendall operating divisions. These processors were linked together using leased lines.

According to Jeffrey Witzburg, Kendall's former director of information management, it made sense to outsource the network and not IS operations. The distributed architecture put data processing in the hands of the divisions, which did not want to relinquish control, whereas the network was a corporate commodity.

K. Wright, telecommunications manager at Lockheed Aeronautical Systems Co. in Burbank, Calif., said his company recently evaluated outsourcing but decided against it because, among other factors, the firm's business outlook was too uncertain for the near future.

Due to a decline in military spending, Lockheed recently announced it is pulling all aircraft operations out of its original location in Burbank, a move that involves transferring thousands of employees to other sites and revamping the firm's data network, Wright said. The company has yet to map out exactly how it plans to reshuffle data processing and network operations after the move.

According to Wright, outsource vendors need users to sign long-term contracts so they can spread the initial costs of consolidating data processing or network operations over a long period of time. This way, they can bid the contract low but still be assured of making a profit in the final years of the contract. Without a clear direction from Lockheed, outsourcing discussions with vendors did not get very far, he said.

"It is difficult to outsource if your business environment is dynamic and changing," Wright said.

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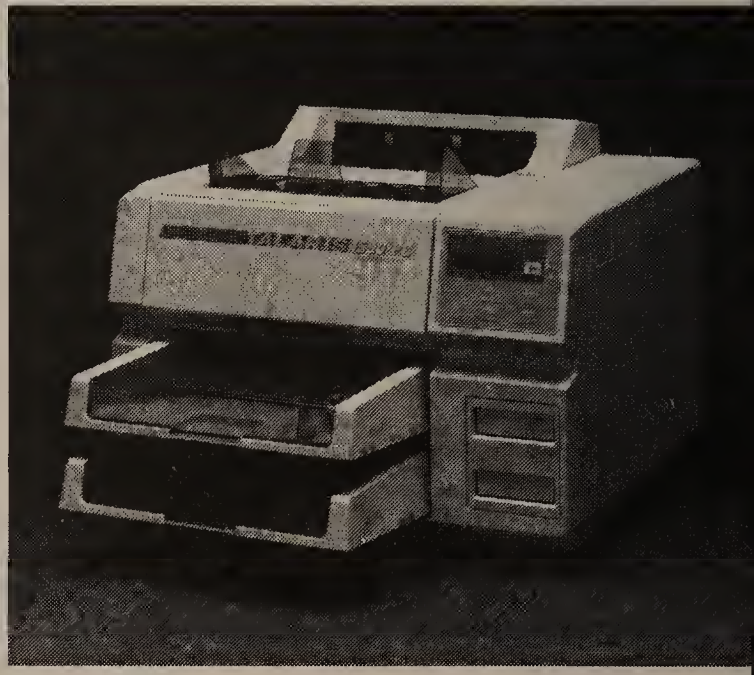

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